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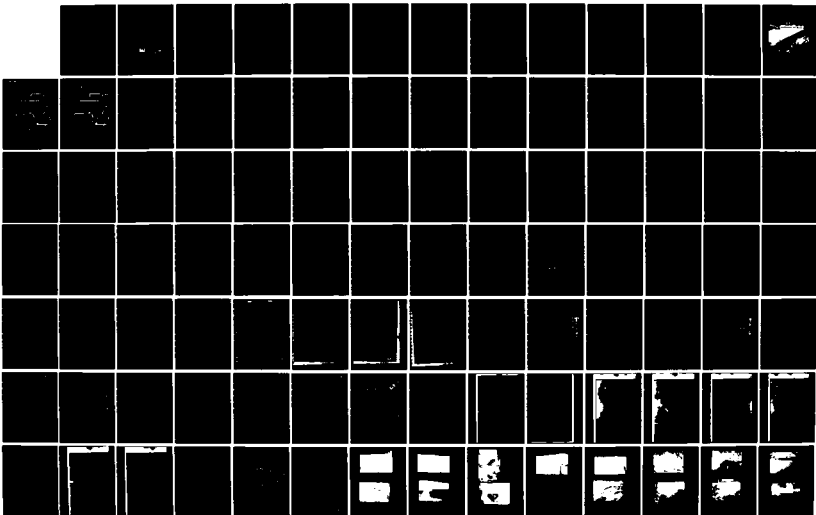
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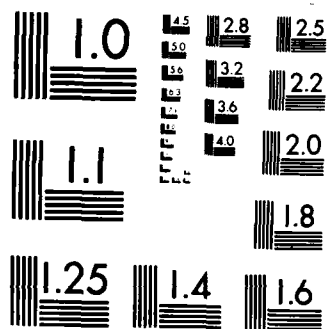
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CONNECTICUT RIVER BASIN
SANDISFIELD, MASSACHUSETTS

AD-A154 667

**NORTH SILVER LAKE DAM
MA 00307**

**PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM**



**DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154**

AUGUST, 1980

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:

JUL 09 1981

NEDED

Honorable Edward J. King
Governor of the Commonwealth of
Massachusetts
State House
Boston, Massachusetts 02133

Dear Governor King:

Inclosed is a copy of the North Silver Lake Dam (MA-00307) Phase I
Inspection Report, prepared under the National Program for Inspection of
Non-Federal Dams. This report is based upon a visual inspection, a
review of the past performance and a brief hydrological study of the
dam. I approve the report and support the findings and recommendations
described in Section 7 and ask that you keep me informed of the actions
taken to implement them. This follow-up action is a vitally important
part.

Copies of this report have been forwarded to the Department of Environ-
mental Quality Engineering.

I wish to thank you and the Department of Environmental Quality
Engineering for your cooperation in this program.

Sincerely,

C. E. EDGAR, III
Colonel, Corps of Engineers
Commander and Division Engineer

Incl
As stated

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) DAMS, INSPECTION, DAM SAFETY, Connecticut River Basin Sandisfield, Massachusetts North Branch Silver Brook		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) North Silver Dam is about 1550 feet long with a maximum height of 76 feet. The dam has a chimney drain and a rock toe for internal drainage. The dam has been classified as intermediate in size with a high hazard potential. The dam is considered to be in fair condition. A major breach of the dam could cause appreciable damage to roads, bridges and residences in the downstream area.		

NORTH SILVER DAM

MA 00307

CONNECTICUT RIVER BASIN
SANDISFIELD, MASSACHUSETTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

Identification No.: MA 00307
Name of Dam: NORTH SILVER DAM
Town: SANDISFIELD
County and State: BERKSHIRE, MASSACHUSETTS
Stream: NORTH BRANCH SILVER BROOK
Date of Inspection: 10 JUNE 1980

BRIEF ASSESSMENT

North Silver Dam is a multi-purpose earth dam, approximately 1550 feet long, with a maximum height of 76 feet. The top width of the dam is about 20 feet. The downstream face is vegetated and has a slope of 2H:1V. The upstream face is vegetated and has a slope of 3H:1V. A riprapped berm is located at the normal pool elevation.

The dam has a chimney drain and a rock toe for internal drainage.

The principal spillway is comprised of a 2-stage concrete riser and a 48-inch reinforced concrete pipe outlet conduit. The normal pool level is controlled by an ungated low-stage orifice. The reservoir can be drawn down by a 24-inch drain. A 100-foot long, 9-foot high emergency spillway is located in an earth and rock cut at the south abutment. The project is considered to be in fair condition.

Because the dam is classified as intermediate size and high hazard potential, the test flood is the Probable Maximum Flood (PMF). The test flood inflow for North Silver Dam, having a drainage area of 3.7 square miles was estimated to be 8,600 cfs. The routed test flood outflow is approximately 6300 cfs. The reservoir level would be about 1.7 feet below the top of the dam.

A major breach of the dam could cause appreciable damage to roads, bridges and residences in the downstream area. Loss of more than a few lives in the Village of West New Boston would also be likely as a result of a dam break.

A number of recommendations and remedial measures are given in Sections 7.2 and 7.3 for implementation by the owner. These recommendations should be implemented within 12 months of receipt of the Phase I Inspection Report, except that measures should be designed and implemented upon receipt of this report to reconstruct areas of the downstream face of the dam where sloughing has occurred, with materials which will minimize recurrence of these problems.

In addition, the owner should have a qualified Registered Professional Engineer assess in detail the surface sloughing condition on the downstream face of the dam, including its potential for initiating more deep-seated slides.

The engineer should also evaluate alternative solutions to this problem. The seepage observed at the north side of the concrete headwall for the 48-inch outlet conduit should be assessed by the engineer and a monitoring and recording program established.

The small cracks in the concrete at the transition between the riser and the 48-inch outlet conduit should be monitored as part of the Operation and Maintenance Inspection Record which is prepared annually by the U.S. Department of Agriculture, Soil Conservation Service. Wheel tracks at the top of the dam and in the emergency spillway should be filled and graded to drain. The gate operator for the 24-inch reservoir drain should be exercised and lubricated at least once a year. Trespassing by unauthorized vehicles across the crest of the embankment and in the emergency spillway sections should be prevented.



A handwritten signature in cursive script that reads "John F. Cysz".

John F. Cysz
Project Manager
MA P.E. No. 28841

This Phase I Inspection Report on North Silver Lake Dam (MA-00307) has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

Aramast Mahtesian

ARAMAST MAHTESIAN, MEMBER
Geotechnical Engineering Branch
Engineering Division

Carney M. Terzian

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

Richard J. DiBuono

RICHARD DIBUONO, CHAIRMAN
Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of the Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify the need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily indicating a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also included.

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OVERVIEW OF
NORTH SILVER DAM

SECTION 5 EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

GENERAL

The North Silver Dam watershed consists of 3.71 square miles of mountainous terrain which is drained by the North Branch of Silver Brook and several unnamed tributaries. The watershed is approximately 5 miles long and 2 miles at its largest dimensions. A 32-acre shallow impoundment, Atwater Pond, is located approximately 2½ miles upstream on the North Branch of Silver Brook. The pool for North Silver Dam is approximately 17 acres or 1% of the drainage

The principal spillway is a drop inlet structure consisting of a two-stage forced concrete riser, outletting through a 48" diameter reinforced concrete pipe approximately 240 feet in length. The riser has a height (floor to crest) of 12 feet and inside dimensions of 4 feet x 12 feet. The weir at the top of the riser has a total length of 24 feet. The normal pool elevation is maintained by a 36" orifice whose invert is approximately 35.5 feet above the floor of the riser. A 24" RCP reservoir drain has an inlet at the toe of the embankment and discharges into the bottom of the riser. The reservoir drain is gated and is controlled by a manual operator located at the top of the riser.

The emergency spillway is an earth and rock cut in the right abutment. The emergency spillway has a 100 foot wide and 30 foot long level section with a concrete sill. The elevation of the emergency spillway level section is approximately 9 feet below top of dam. The emergency spillway discharges through a graded exit channel approximately 100 feet long with a 3% slope. The emergency spillway discharge is then through a natural forested area on about a 20% slope to the North Branch of Silver Brook.

The dam was designed by the Soil Conservation Service to retard a 100 year storm event without flow occurring in the emergency spillway.

DESIGN DATA

The hydraulic/hydrologic design file for North Silver Dam was made available by the Soil Conservation Service and is on file at their Amherst, Massachusetts office.

EXPERIENCE DATA

Construction of the North Silver Dam was completed in 1970. According to the USGS, the maximum water surface elevation reported to date occurred in the spring of 1980 when flood waters rose to approximately 8 feet below the crest of the overflow weir (approximate elevation 1320 MSL).

TEST FLOOD ANALYSIS

The North Silver Dam is classified as intermediate in size, having a crest of 76 feet and a top of dam storage of 1500 acre-feet. The dam was designed to have a high hazard classification. Using the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the test flood is the probable Maximum Flood (PMF).

SECTION 4 OPERATIONAL AND MAINTENANCE PROCEDURES

OPERATIONAL PROCEDURES

a. General

The only manual procedure for the project is operation of the reservoir drain. The principal spillway and the emergency spillway are ungated and there are no operational procedures other than maintenance.

b. Description of any Warning System in Effect

There is no formal written warning system in effect. The Soil Conservation Service inspects the dam after major storms and assists in surveillance of the structure during major storms.

MAINTENANCE PROCEDURES

a. General

An annual maintenance contract for the project is issued by the Resources Commission based on the SCS yearly Operation and Maintenance Action Record.

b. Operating Facilities

Necessary maintenance and needed repairs to the embankment, principal and emergency spillways, appurtenances, reservoir area, outlet channels, access road are carried out in the annual maintenance contract. A copy of the SCS Operation and Maintenance Record check list is included in Appendix B.

EVALUATION

The existing formal inspection and maintenance procedures including the technical inspection are good. The 24-inch reservoir drain sluice gate should be operated periodically to exercise the mechanism. Periodic lubrication and preventive maintenance of the mechanism should be carried out in accordance with the manufacturer's recommendations. The key for the gate operating handle should be secured to the operating shaft.

A formal written surveillance and downstream warning (emergency preparedness) plan should be established for this structure.

channel, as well as over-hanging trees.

The North Branch of Silver Brook passes under Veits Road (Photographs 12 and 13) about 3000 feet downstream from the damsite, then joins the South Branch of Silver Brook which passes under Back Road approximately 1 mile downstream from the damsite. Silver Brook then flows under Route 57 about 1.7 miles downstream from the damsite where it joins the Clam River in the Village of West Boston (see Location Map). There is one residence on Veits Road approximately 300 feet southerly of the North Branch of Silver Brook crossing. This residence is about 20 feet higher than the floor of the stream channel. There are two residences in the proximity of the Silver Brook Back Road crossing located approximately 300 and 500 feet respectively from the crossing. These residences are about 35 feet higher than the stream channel at Back Road. There are several residences in the Village of West New Boston in very close proximity to the crossing of Silver Brook under Route 57. Two of these structures are next to the brook and their floor elevation is close to that of the brook (Photographs 14 and 15).

EVALUATION

Based on the visual inspection, the North Silver Dam is in fair condition. The surface sloughing problem on the downstream face requires attention and should be corrected before further deterioration leads to a serious condition. Since it appears that there will be a continuing problem on the downstream face, which is of unusual steepness (2H:1V) for the type of material used in construction and climatic conditions, they should be repaired and carefully monitored. If these slough areas were left to progressively worsen, they could eventually result in deeper, more serious embankment slides.

The seepage from the rock toe near the principal spillway outlet should be monitored.

of the discharge channel. The discharge channel is forested downstream of the exit channel and has the natural slope of approximately 20 percent. The floor of the approach channel and level section is in satisfactory condition and appears to be well-graded and grassed. There are minor wheel tracks in the approach channel. The concrete weir at the control section of the emergency spillway is in good condition.

c. Appurtenant Structures

The concrete riser (principal spillway) is located to the right of the middle of the dam and is in generally good condition. (See Appendix C, photographs 5 & 6.) There is minor debris at the trash rack on the low stage riser orifice. The general condition of the principal spillway riser is good, with no spalling, rusting or staining of concrete apparent. Minor seepage, efflorescence and cracking was detected at the transition of the riser with the 48" outlet conduit. This condition is being monitored by SCS (see Section 6).

Inspection of the 48" outlet conduit indicated that the general condition of the concrete was good with only minor staining and negligible spalling. No erosion or cavitation was evident. There was hairline cracking of the concrete near several pipe joints. The alignment of joints was good. The outlet conduit headwall is in good condition. (See Appendix C, photograph 10.) No erosion or cavitation was evidenced. Minor seepage was noted to the north of the headwall at its base. The condition of the joints in the outlet headwall and wingwalls were good.

During the inspection the gate for the 24" reservoir drain was opened without difficulty. The gate would not seat tightly upon closure due to accumulation of rust in the operating mechanism. This condition has subsequently been remedied and the gate is operating satisfactorily. Routine cleaning and lubrication of the gate mechanism is necessary to prevent this condition from reoccurring.

d. Reservoir Area

The normal pool has a surface area of approximately 17 acres and the flood control pool has a surface of approximately 41 acres. According to file letters, the property taking line for the Massachusetts Water Resources Commission falls near but outside the design flood control elevation. There are no residences or other structures in the vicinity of the reservoir area. The permanent pool extends westerly from the dam approximately 1,000 feet along the North Branch of Silver Brook, and approximately 600 feet from the dam along the small unnamed tributary to the north of the main stream (See Appendix C, photograph 16). The flood control pool extends approximately 1800 feet back from the dam along the North Branch of Silver Brook and approximately 1300 feet back from the dam along the northern tributary.

e. Downstream Channel

The channel of the North Branch of Silver Brook downstream from the damsite is contained in a narrow valley with steep side slopes. The channel has a steep gradient of over 100 feet of drop within 1500 feet of the damsite. The downstream discharge channel is in bedrock. There are large boulders in

SECTION 3 VISUAL INSPECTION

3.1 FINDINGS

a. General

The North Silver Dam was inspected on June 10, 1980. At that time the water surface was approximately at the normal pool elevation of 1303.5 MSL. The 24" reservoir drain gate was opened by SCS personnel in order to lower the water surface below normal pool orifice so that 48" principal spillway conduit and riser could be inspected internally.

b. Dam

The North Silver Dam is a compacted earthfill on a bedrock and glacial till foundation. The embankment has a height of 76 feet, a crest length of 1550 feet and a crest width of 20 feet. The upstream slope is 3H:1V and the downstream slope is 2H:1V. As shown in the as-built plans (Appendix B), the embankment is composed of three zones and has a chimney drain and a rock filled toe drain to control seepage. The principal spillway is a drop inlet structure consisting of a two-stage reinforced concrete riser and a 48" RCP outlet conduit beneath the embankment. The inlet for the 24-inch reservoir drain is located 110 feet upstream of the riser at invert elevation 1270.9 MSL, and was not visible during the inspection.

Visual inspection of the embankment showed serious surface sloughing on the downstream slope in an area approximately 200 feet north of the emergency spillway. (See General Plan, Appendix B-3, and Photographs 8 & 9, Appendix C.) This condition has been reoccurring since completion of the dam and has been the subject of several investigations by the Soil Conservation Service. A discussion of these investigations is presented in Section 6 of this report. Other than the surface sloughing of the downstream slope, the embankment appears to be in a stable condition. There was no obvious visible evidence of previously reported and repaired surface sloughing of the downstream slope near the north abutment. No lateral movement was apparent during the visual inspection and the vertical and horizontal alignment appeared good. No piping or boils were detected. There was no trespassing on the slopes; however, vehicle tracks on the crest of the dam trap water (See Appendix C, Photograph 2). These should be filled and graded to drain towards the reservoir. The downstream face of the embankment is vegetated with a thick growth of Crown Vetch which is approximately 10 inches high. The thickness of this growth makes it difficult to detect minor cracking, sloughing or animal burrows on the downstream face of the embankment. The riprap on the upstream berm at the normal pool elevation is in good condition.

Some seepage was noted at the toe of the embankment near the north side of the outlet headwall for the principal spillway conduit. The seepage was emanating from the rock toe. It was not possible to determine the source or the rate of this flow. The seepage was clear.

The general condition of the emergency spillway is good. There are no loose rocks or trees overhanging the approach channel or the control section

SECTION 2 ENGINEERING DATA

2.1 DESIGN DATA

The design data for North Silver Dam was made available by the Soil Conservation Service and is on file in their Amherst, Massachusetts office.

2.2 CONSTRUCTION DATA

Construction records for the dam were also made available and are on file with the Soil Conservation Service, Amherst, Massachusetts.

2.3 OPERATION DATA

The dam is inspected annually by SCS personnel. Copies of their Operation and Maintenance Inspection Record for the years 1977 through 1980 are enclosed in Appendix B. An annual maintenance contract is issued by the Massachusetts Water Resources Commission to carry out the work called for in the SCS O & M Inspection Record.

According to the Soil Conservation Service, the damsite is also inspected by SCS personnel after each major storm event.

2.4 EVALUATION OF DATA

a. Availability

Engineering design and construction data for the dam, including as-built plans, are available at the Soil Conservation Service offices in Amherst, Massachusetts. Soil Conservation Service and Massachusetts Department of Public Works inspection reports are also available and are included in Appendix B.

b. Adequacy

The final assessments and recommendations of this investigation are based upon the visual inspection, the hydrologic and hydraulic calculations, and the engineering data supplied by the Soil Conservation Service.

c. Validity

The engineering design data, provided by the SCS for North Silver Dam has been deemed adequate for the purpose of this Phase I Inspection. The as-built plans appear to adequately represent the present configuration of the dam based upon the visual field inspection. This investigation did not include a detailed engineering check of the SCS design file.

j. Regulating Outlets - Principal spillway

- (1) Invert - 1268 MSL at Riser Floor
- (2) Size - 48" diameter Reinforced Concrete Conduit
- (3) Description - 2 stage riser with:
 - 1.) 24" gated reservoir drain, invert - 1270.9 MSL at inlet
 - 2.) 10" x 36" Normal Pool orifice, invert 1303.5 MSL
 - 3.) 24' Flood Pool weir invert 1328.0 MSL
- (4) Control Mechanism - Manual gate operator for reservoir drain on floor stand mounted on top of riser.

- (3) Spillway crest - 46 (emergency spillway)
- (4) Test flood pool - 58
- (5) Top of dam - 60

g. Dam

- (1) Type - earth embankment
- (2) Length - 1550'
- (3) Height - 76'
- (4) Top Width - 20'
- (5) Side Slopes - 3H:1V upstream; 2H:1V downstream
- (6) Zoning - 3 zones & rock fill toe (See Appendix B3-5)
- (7) Impervious Core - embankment Zone 1; see cross-section Appendix B3-5
- (8) Cutoff - 20 - 35' wide x 4' deep trench
- (9) Grout curtain - grout at seepage area under principal spillway conduit
- (10) Other - Chimney and rock fill toe drains

h. Diversion and Regulating Tunnel - None

i. Spillway - Emergency

- (1) Type - Earth & rock cut in right abutment with concrete weir and 30' wide level section
- (2) Length of weir - 100'
- (3) Crest elevation - 1332.0
- (4) Gates - No
- (5) U/S Channel - grassed 2% slope, 450' long.
- (6) D/S Channel - grassed for 100' \pm (3% slope) then forested (20% \pm slope)
- (7) General - design calls for no flow in emergency spillway for 100-year storm event

- (8) Total project discharge at top of dam-8500 cfs @ 1341 MSL
- (9) Total project discharge at test flood elevation 6300 cfs @ 1339.3 MSL.
- c. Elevation (Datum is feet above sea level NGVD, referred to in this report as MSL)
 - (1) Streambed at toe of dam - 1265 MSL
 - (2) Bottom of cutoff - varies; 1265 MSL at lowest point
 - (3) Maximum tailwater - unknown
 - (4) Normal pool - 1303.5 MSL (low stage orifice)
 - (5) Full flood control pool - 1328 MSL (crest of riser)
 - (6) Spillway crest - 1332 MSL (Emergency spillway)
 - (7) Design surcharge (original design) - 1333.9 MSL
 - (8) Top of dam - 1341.1 to 1342.6 MSL (camber in center for settlement)
 - (9) Test flood surcharge - 1339.3 MSL.
- d. Reservoir (Length in feet)
 - (1) Normal pool - 1000 feet
 - (2) Flood control pool - 1800
 - (3) Spillway crest pool - 2000 (Emergency Spillway)
 - (4) Top of dam - 2200
 - (5) Test flood pool - 2100.
- e. Storage (acre-feet)
 - (1) Normal pool - 179 (including 35 AF of sediment)
 - (2) Flood control pool - 862
 - (3) Spillway crest pool - 1040
 - (4) Top of dam - 1500
 - (5) Test flood pool - 1400.
- f. Reservoir Surface (acres)
 - (1) Normal pool - 17
 - (2) Flood-control pool - 41 (crest of riser)

Construction was completed by Petricca Construction Company of Pittsfield, Massachusetts in 1970. The original design file, construction records, and as-built plans are available at the Soil Conservation Service in Amherst, Massachusetts.

i. Normal Operating Procedure

The handle for the gate operating mechanisms for the reservoir drain is kept by the Soil Conservation Service's Pittsfield, Massachusetts office. A 10" x 36" ungated orifice which maintains the normal pool at approximate elevation 1303.5 MSL requires no operation. The emergency spillway is ungated and requires no operation.

1.3 PERTINENT DATA

a. Drainage Area

The watershed consists of 3.71 square miles (2,374 acres) of mountainous wooded terrain which is drained by the North Branch of Silver Brook and a small unnamed tributary that join at the damsite. The normal pool for the North Silver Dam has a surface area of 17 acres which is approximately 1% of the watershed. There are only a few residences in the watershed.

b. Discharge at Damsite

The normal discharge at the damsite is through the principal spillway which consists of a 60-foot high 2-stage concrete riser drop inlet with an anti-vortex cover slab. The riser has inside dimensions of 4 feet x 12 feet and drains through a 240-foot long, 48-inch RCP conduit. The riser and outlet conduit are located to the right of the embankment center. The outlet conduit discharges at a reinforced concrete headwall at the downstream toe (See Appendix C, Photograph 10). The riser has a 10" x 36" orifice which controls the level of the normal pool (invert elevation 1303.5 MSL) and a weir at the crest of total length 24-feet (elevation 1328.0 MSL). Trash racks are provided for both the low stage (normal pool) and high stage (flood pool) outlets.

An emergency spillway is cut into the south abutment. The level control section is 100 feet long, 30 feet wide, and has a reinforced concrete sill set at elevation 1332, about 9 feet below the top of the dam.

- (1) Outlet works (conduits) 24" reservoir drain, invert elevation 1270.9 MSL and discharge capacity 81 cfs (at normal pool elevation 1303.5 MSL).
- (2) Maximum flood at damsite - unknown.
- (3) Ungated spillway capacity @ top of dam 8500 cfs @ 1341.0 MSL. The emergency spillway capacity is 8000 cfs and the principal spillway capacity is 500 cfs at top of dam.
- (4) Ungated spillway capacity at test flood elevation 6300 cfs @ 1339.3 MSL.
- (5) Gated spillway capacity at normal pool elevation - no gated spillway.
- (6) Gated spillway capacity at test flood elevation - no gated spillway.
- (7) Total spillway capacity at test flood elevation 6300 cfs @ 1339.3 MSL.

weir at the top of the riser has a total length of 24 feet, 12 feet on each side, protected by High Stage Trash Racks. The normal pool (elevation 1303.5) is controlled by a 10" x 36" orifice whose invert is approximately 35.5 feet above the floor of the riser. The Low Stage Trash Rack protects this orifice. A 24" RCP reservoir drain approximately 107 feet long has an inlet with a trash rack at the toe of the embankment (invert elevation 1270.9), and ties into the bottom of the riser. The reservoir drain is gated and is controlled by a manual operator on a floor stand mounted on top of the riser.

The emergency spillway is an earth and rock cut in the right abutment (see Appendix C, Photograph 7). The emergency spillway has a 100-foot wide and 30-foot long level control section, with a concrete sill. The elevation of the emergency spillway level section is 1332, which is approximately 9 feet below top of dam. The emergency spillway discharges through a grassed exit channel approximately 100 feet long with a 3% slope. The emergency spillway discharge is then through a natural forested area on about a 20% slope to the North Branch of Silver Brook.

The dam was designed by the U.S. Department of Agriculture, Soil Conservation Service (SCS), and constructed in 1970. A monumented baseline and bench mark have been established at the site as shown on the as-built plans. The hydraulic design of the dam and its appurtenances was based on the ability to retard a 100-year frequency storm without discharge occurring in the emergency spillway.

c. Size Classification

Intermediate (height 76 feet; top of dam storage 1500 acre-feet) based on height and storage (40 to 100 feet; 1000 to 50,000 acre-feet) as given by the Corps of Engineers in the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification

High hazard. The dam is located in an area where failure may damage several homes and secondary highways. Loss of more than a few lives would be likely (see Section 5.5).

e. Ownership

The dam is owned by the Commonwealth of Massachusetts, Water Resources Commission, 100 Cambridge Street, Boston, MA 02202, Telephone: (617) 727-3267.

f. Operator

The dam is operated by the Commonwealth of Massachusetts, Water Resources Commission. The Soil Conservation Service, Berkshire District, maintains the operating handle for the 24-inch reservoir drain and performs all engineering work related to operation and maintenance of the structure including annual inspection. U.S. Department of Agriculture, Soil Conservation Service, Berkshire District, 78 Center Street, Pittsfield, MA 01201, Telephone: (413) 443-6867.

g. Purpose of Dam

North Silver Dam is a multiple-purpose floodwater retarding dam and recreational reservoir. It is one of six floodwater retarding and recreation dams in the Clam River watershed.

h. Design and Construction History

The dam was designed by the U.S. Department of Agriculture, Soil Conservation Service as part of the Clam River Watershed Project in 1967.

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT
NORTH SILVER DAM
SECTION I
PROJECT INFORMATION

1.1 GENERAL

a. Authority

Public Law 92-367, August 8, 1972 authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Robert G. Brown & Associates, Inc. has been retained by the New England Division to inspect and report on selected dams in the Commonwealth of Massachusetts. Authorization and notice to proceed were issued to Robert G. Brown & Associates, Inc. under a letter of 14 March 1980 from William E. Hodgson, Colonel, Corps of Engineers. Contract No. DACW33-80-C-0037 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection

- (1) To perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.
- (2) To encourage and prepare the States to initiate quickly effective dam safety programs for non-Federal dams.
- (3) To update, verify and complete the National Inventory of Dams.

1.2 DESCRIPTION OF PROJECT

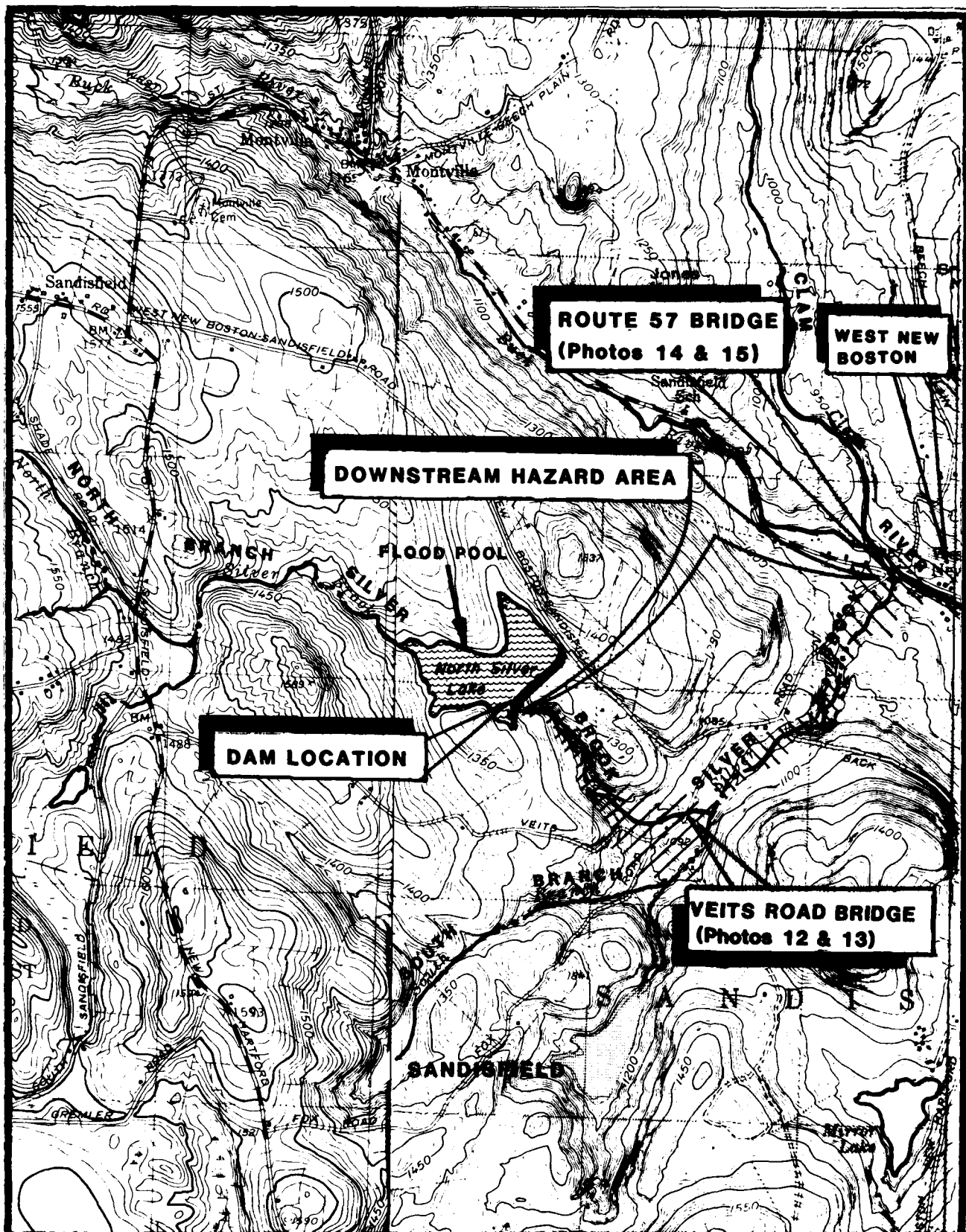
a. Location

The North Silver Dam is located in the Town of Sandisfield in Berkshire County, Massachusetts. This multiple-purpose dam is located on the North Branch of Silver Brook about 1½ miles west of the village of West New Boston. It is one of six multiple-purpose floodwater retarding dams in the Clam River watershed. North Silver Dam is shown on the USGS Tolland Center, Massachusetts-Connecticut quadrangle at Latitude 42° 5.7', and Longitude 73° 7.0'. North Silver Dam is in the upland section of the New England Physiographic Province, in what is locally referred to as the Berkshire Hills.

b. Description of Dam and Appurtenances

North Silver Dam is compacted earthfill on bedrock and glacial till foundation. The embankment has a hydraulic height of 76 feet (measured from top of dam to invert of 48" outlet), a crest length of 1550 feet, and a crest width of 20 feet. The embankment has a 3H:1V vegetated upstream slope and a 2H:1V downstream slope. A chimney drain and rock-filled toe drain are used to control seepage through the embankment and foundation.

The principal spillway (see Appendix C, Photographs 4-6) is a drop inlet structure consisting of a two-stage reinforced concrete riser, discharging through a 48" diameter reinforced concrete conduit with rubber O-ring joints approximately 240 feet in length. The conduit is bedded on a concrete cradle set in ledge and has several reinforced concrete anti-seep collars. The riser has a height (floor to crest) of 60 feet and inside dimensions of 4 feet x 12 feet. The



NORTH SILVER LAKE DAM

SANDISFIELD, MASS.

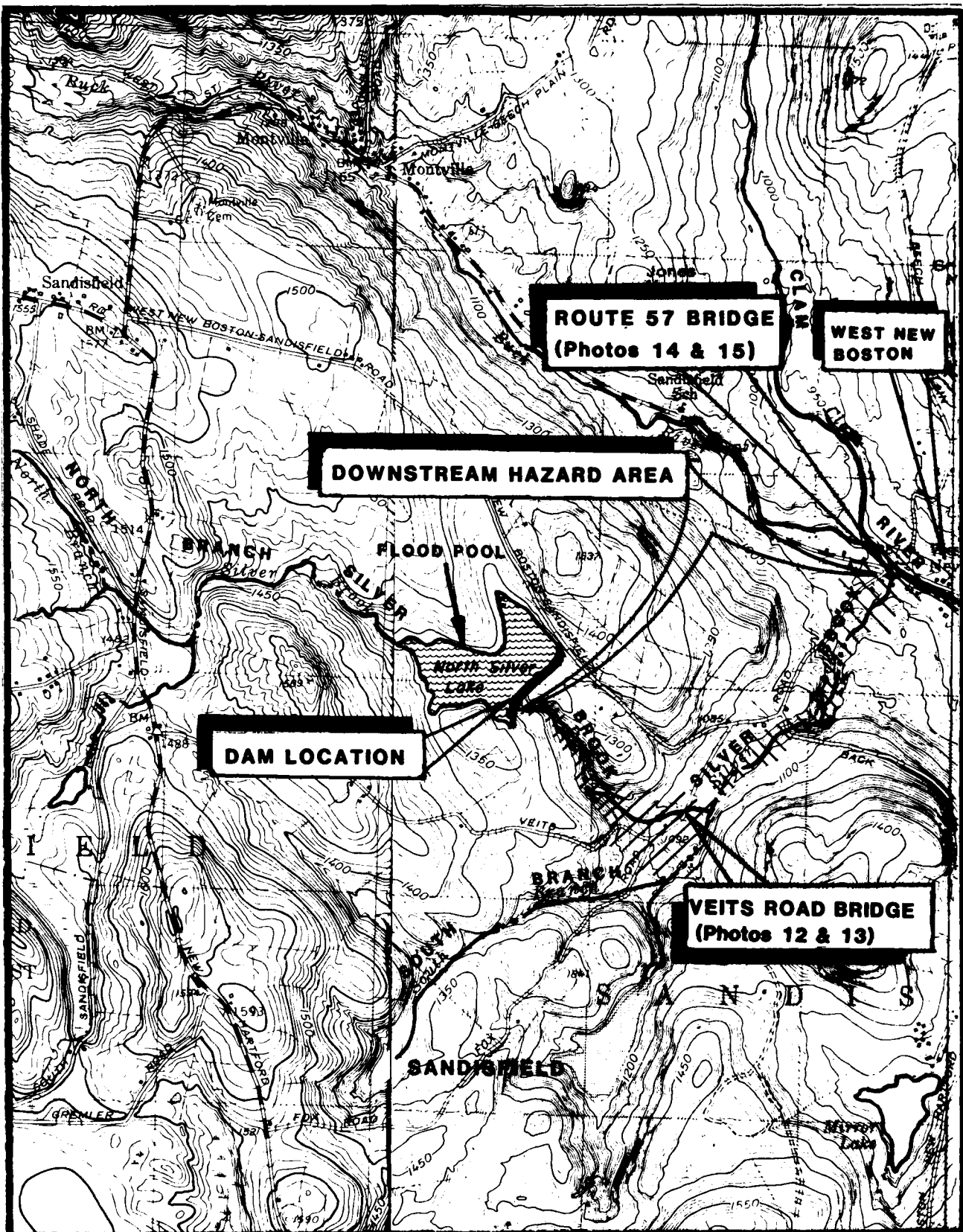
Identification No. MA 00307



Tolland Center Quadrangle

1:25000

vi



NORTH SILVER LAKE DAM

SANDISFIELD, MASS.

Identification No. MA 00307



vi

Tolland Center Quadrangle

1:25000

The test flood inflow for North Silver Dam, which has a drainage area of 3.71 square miles, was estimated to be 8600 cfs. The watershed is mountainous and a maximum probable flood peak flow rate of 2325 csm was determined from the Corps "Preliminary Guidance for Estimating Maximum Probable Discharges". Storage effects would produce a test flood outflow of 6300 cfs. At the initiation of the test flood routing analysis the water surface was assumed to be at normal pool elevation (1303.5 MSL). This analysis indicates that the water surface elevation behind the dam during PMF test flood conditions would be approximately 1339.3 MSL. This is 1.7 feet below the top of dam elevation (1341.0 MSL). The water depth discharging through the emergency spillway under these conditions would be approximately 7.3 ft. deep. The combined discharge for both the emergency and principal spillways would be 6300 cfs.

The $\frac{1}{2}$ PMF inflow was estimated to be 4300 cfs. Storage effects would produce a $\frac{1}{2}$ PMF outflow of 2500 cfs. The water surface elevation behind the dam during $\frac{1}{2}$ PMF conditions is estimated to be approximately 1336.0 MSL. This is 5.0 feet below the top of dam and 4.0 feet above the crest of the emergency spillway.

5.5 DAM FAILURE ANALYSIS

The impact of dam failure was assessed at test flood conditions (elevation 1339.3 MSL). Guidance for Estimating Downstream Dam Failure Hydrographs issued by the Corps of Engineers were used. A breach width of 40% of the dam length at mid-height was assumed (520 feet). The breach discharge was determined to be approximately 504,000 cfs. When added to the 5700 cfs discharge through the emergency spillway under these conditions, a total breach discharge of approximately 510,000 cfs results.

Downstream valley storage is not sufficient enough to cause an appreciable attenuation of the breach discharge before it reaches Veits Road. A flood-wave height during breach conditions of approximately 50 feet was determined for a typical valley section approximately 2000 feet downstream from the dam. Just prior to passing under Veits Rd., the gradient and side slopes of the stream channel flatten somewhat. Under breach conditions, a flood-wave height of approximately 19 feet was determined for a typical valley section approximately 3000 feet downstream from the dam. Flow velocities in these typical valley sections would be on the order of 40 to 50 feet per second. The water surface elevation would be approximately 10 feet over Veits Road at the North Branch of Silver Brook. Three residences could be damaged or destroyed in this area. They would not be flooded by the antecedent flow of approximately 6,300 cfs. The depth of flooding in these residences due to the breach flow is estimated to be 5 to 10 feet. Valley storage between Veits Road and Back Road would attenuate the breach flow to an estimated 397,000 cfs.

Neither the Back Road Bridge over Silver Brook (approximately 1 mile downstream from the dam) nor the Route 57 bridge over Silver Brook (approximately 1.7 miles downstream from the dam) have the capability of passing the attenuated breach flow of 397,000 cfs. Approximately 10 residences in West New Boston could be damaged or destroyed by the breach flood-wave which would have an estimated height of 20 feet at this location. Prior to the breach, water would be just flowing over Route 57 and two to three residences would potentially be flooded at depths estimated to be in the order of 2 feet. The breach flow would flood approximately 10 residences at depths ranging from 2 to 10 feet. Appreciable property damage and loss of more than a few lives under breach conditions would be likely. Therefore, North Silver Dam has been classified as High Hazard.

SECTION 6 EVALUATION OF STRUCTURAL STABILITY

6.1 VISUAL OBSERVATIONS

The structural condition of the principal spillway riser is good. There is no spalling of the concrete and there is only minor efflorescence associated with small cracks at the transition of the riser with the 48" outlet conduit. These cracks at the present time do not jeopardize the structure; however, they should be formally monitored. This condition was the subject of a field investigation by the SCS in August of 1977. The results of the investigation indicated that the structure was sufficiently reinforced and supported in order to prevent serious cracking from developing. This investigation also recommended inspection of this condition at least every two years. (See attached SCS Memorandum September 26, 1977 in Appendix B.)

The 48" outlet conduit is in good condition with only minor staining on the concrete, negligible spalling and hairline cracking near some of the joints. The alignment and spacing of joints is good.

The outlet conduit headwall is in good condition (see Appendix C, Photograph 10). No erosion or cavitation was evidenced. Minor seepage was noted emanating near the base of the headwall. The condition of the joints in the outlet headwall and wingwalls were good with only minor cracking noted.

The general condition of the emergency spillway is good.

There is serious surface sloughing on the downstream slope of the embankment in an area approximately 200 feet north of the emergency spillway. This condition has been recurring since completion of the dam in 1970 and has been investigated in depth by the Soil Conservation Service, Soil Mechanics Laboratory in Lincoln, Nebraska. According to this investigation, the possibility of surface slips leading to more extensive slides, should they not be promptly repaired, is difficult to evaluate. Their analysis did show that the factor of safety for a further failure was decreased for the two cases analyzed after removal of material from the toe of the slip circle.

It appears, based upon previous investigations of this condition conducted by the Soil Conservation Service as well as upon the visual inspection, that this sloughing is a surface condition related to the weathering and freeze/thaw cycles on the till used in the downstream embankment slope, which at 2H:1V is relatively steep for the type of material used and the climatic conditions. This condition can be expected to continue in the future. If left unattended, there is a possibility that these surface slips may lead to larger failures.

6.2 DESIGN AND CONSTRUCTION DATA

The design and construction files including as-built plans for the dam are available from the Soil Conservation Service in their Amherst, Massachusetts office and from the Massachusetts Water Resources Commission.

6.3 POST-CONSTRUCTION CHANGES

The downstream slope has been repaired and revegetated where surface sloughs have occurred in the past.

6.4 SEISMIC STABILITY

This dam is located in Seismic Zone 2 and, in accordance with the Phase I guidelines, does not warrant a seismic analysis.

SECTION 7
ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Condition

The visual inspection indicates that the North Silver Dam is in fair condition. The one major concern with respect to the integrity of the dam, if left uncorrected, is the persistent surface sloughing of the downstream embankment.

b. Adequacy of Information

The design, construction, and inspection files available for this dam, along with the visual inspection, are adequate for the purpose of the Phase I investigation.

c. Urgency

The recommendations made in 7.2 and 7.3 should be implemented by the owner within one year, except as noted, after receipt of this Phase I Inspection Report.

7.2 RECOMMENDATIONS

The owner should have a qualified Registered Professional Engineer:

- (1) Assess in detail the surface sloughing condition on the downstream embankment. The engineer should re-evaluate the stability of the embankment considering the steepness of the downstream embankment and the frost susceptibility of the embankment materials.
- (2) Design and supervise measures to reconstruct areas of the downstream embankment where sloughing has occurred with materials which will minimize a recurrence of these problems. (1) and (2) should be done immediately upon receipt of this report.
- (3) Assess and monitor the seepage at the downstream toe of the dam in the vicinity of the outlet conduit headwall.

The owner should carry out all recommendations made by the engineer.

7.3 REMEDIAL MEASURES

a. Operating and Maintenance Procedures

The owner should:

- (1) Insure that monitoring of the cracks at the transition between the riser and outlet conduit is included in the annual SCS Operation and Maintenance Inspection Record.

- (2) Prevent trespassing by vehicles across the crest of the embankment and in the emergency spillway section.
- (3) Fill the wheel tracks at the crest of the dam and regrade toward the reservoir in order to prevent ponding of surface water.
- (4) Exercise and lubricate the gate operator for the 24-inch reservoir drain sluice gate at least once a year and perform preventive maintenance at intervals as specified by the manufacturer, Rodney Hunt. The key for the operating handle should be secured to the operating shaft.
- (5) Provide round-the-clock surveillance during periods of unusually heavy precipitation.
- (6) Develop a formal written program for warning downstream residents in case of emergency (emergency preparedness program).
- (7) Continue the annual technical inspections.

7.4 ALTERNATIVES

There are no practical alternatives to the above recommendations.

APPENDIX A

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION PARTY ORGANIZATION

NATIONAL DAM INSPECTION PROGRAM

DAM: North Silver Dam MA 00307

DATE: 10 June 1980

TIME: 9:00 a.m.

WEATHER: Cloudy 60°

W.S. ELEV. 1303 U.S. 1265 DN.S.

ELEV. DATUM: MSL - Datum of Construction Plans

INSPECTION PARTY:

1. J. F. Cysz, P.E.

2. K. N. Hendrickson, P.E.

3. J. E. Walsh, P.E. (Baystate Environmental Consultants, Inc.)

4. L. D. Zwingelstein

5. H. T. Shumway

6. _____

NOTE: Interior of 48" conduit
and riser inspected by
J. F. Cysz. All other
project features inspected
by all party members.

OTHERS PRESENT DURING INSPECTION:

1. R. Curran - Soil Conservation Service

2. _____

3. _____

4. _____

VISUAL INSPECTION CHECKLIST

DAM: North Silver Dam MA 00307

DATE: June 10, 1980

AREA EVALUATED

CONDITION

DAM EMBANKMENT

Crest Elevation	1341 MSL design as-built
Current Pool Elevation	1303.5 MSL at low stage orifice (normal pool).
Maximum Impoundment to Date	Near bottom of high stage trash rack-reported about 1320 MSL, Spring 1980.
Surface Cracks	None
Pavement Condition	No pavement
Movement or Settlement of Crest	See as-built elevations - wheel tracks in crest trap water
Lateral Movement	None detected
Vertical Alignment	Good
Horizontal Alignment	Good
Condition at Abutment and at Concrete Structures	No concrete structures at abutment - concrete at emergency spillway control section is OK.
Indications of Movement of Structural Items on Slopes	No indication of significant movements in riser or headwall for 48" conduit.
Trespassing on Slopes	None on slopes
Vegetation on Slopes	Crown vetch on downstream slope, grass on upstream slope
Sloughing or Erosion of Slopes or Abutments	Yes - serious on downstream slope, none on upstream slope (see note)
Rock Slope Protection - Riprap Failures	Good - no riprap failure at berm for permanent pool.
Unusual Movement or Cracking at or near Toes	None detected
	Note: Heavy growth of crown vetch may obscure early stages of sloughing.

VISUAL INSPECTION CHECKLIST

DAM: North Silver Dam MA 00307

DATE: June 10, 1980

AREA EVALUATED

CONDITION

DAM EMBANKMENT (cont'd.)

Unusual Embankment or Downstream
Seepage

Seepage at north side headwall possibly
from rain previous evening

Piping or Boils

None detected

Foundation Drainage Features

Rock toe and chimney drain

Toe Drains

Rock toe and chimney drain

Instrumentation System

None

VISUAL INSPECTION CHECKLIST

DAM: North Silver Dam MA 00307 DATE: June 10, 1980

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE</u>	Includes 24" reservoir drain and low-stage orifice inlet
a. Approach Channel	
Slope Conditions	Riprap berm OK at normal pool and intake channel for low-stage orifice
Bottom Conditions	OK
Rock Slides or Falls	None detected
Log Boom	None
Debris	Minor buildup of debris at trash rack for low-stage orifice
Condition of Concrete Lining	None
Drains or Weep Holes	None
b. Intake Structure	
Condition of Concrete	Good
Stop Logs and Slots	No stop logs or slots; trash rack only (see photograph)
	Note: Inlet headwall for 24" Reservoir drain was submerged and not visible.

VISUAL INSPECTION CHECKLIST

DAM: North Silver Dam MA 00307

DATE: June 10, 1980

AREA EVALUATED

CONDITION

OUTLET WORKS - CONTROL TOWER

Includes riser

a. Concrete and Structural

General Condition

Good

Condition of Joints

Good

Spalling

None detected

Visible Reinforcing

None

Rusting or Staining of Concrete

Minor at and above transition with 48" conduit

Any Seepage or Efflorescence

Minor efflorescence associated with small cracks in concrete at transition with 48" conduit. Minor seepage at horizontal joint above transition.

Joint Alignment

Good alignment

Unusual Seepage or Leaks in Gate Chamber

Gate didn't seat when closed; gate itself looks OK

Cracks

Yes - minor at transition with 48" conduit. Should be monitored.

Rusting or Corrosion of Steel

None

b. Mechanical and Electrical

Air Vents

None

Float Wells

None

Crane Hoist

None

Elevator

None

Hydraulic System

None

Service Gates

24" Rodney Hunt reservoir drain

Emergency Gates

None

VISUAL INSPECTION CHECKLIST

DAM: North Silver Dam MA 00307

DATE: June 10, 1980

AREA EVALUATED

CONDITION

OUTLET WORKS - CONTROL TOWER (cont'd.)

Lightning Protection System None

Emergency Power System None

Wiring and Lighting System None
in Gate Chamber

Note: No electrical-manual gate operator
for 24-inch reservoir drain. Gate
is manufactured by Rodney Hunt.

Key for gate handle should be
brazed to shaft.

Riser has manhole in top, but no
inspection ladder.

VISUAL INSPECTION CHECKLIST

AM: North Silver Dam MA 00307

DATE: June 10, 1980

AREA EVALUATED	CONDITION
<u>UTLET WORKS - TRANSITION AND CONDUIT</u>	Includes 48" RCP outlet conduit
General Condition of Concrete	Good
Rust or Staining on Concrete	Minor
Spalling	Negligible
Erosion or Cavitation	None detected
Cracking	Minor cracking with efflorescence at transition with riser
Alignment of Monoliths	Not applicable
Alignment of Joints	Good
Number of Monoliths	Not applicable
	NOTE: Joint spacing (joint gap) good. Not more than about 1" anywhere. Some hairline cracks in walls of concrete pipe near joints. No leakage detected through wall of conduit. (Lock joint concrete pressure pipe.)
A-7	

VISUAL INSPECTION CHECKLIST

DAM: North Silver Dam MA 00307 DATE: June 10, 1980

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL</u>	Includes headwall for 48" outlet conduit
General Condition of Concrete	Good
Rust or Staining	Minor
Spalling	Minor
Erosion or Cavitation	None
Visible Reinforcing	None
Any Seepage or Efflorescence	Minor seepage at base of headwall north side.
Condition at Joints	OK
Drain Holes	None
Channel	
Loose Rock or Trees Overhanging Channel	Trees overhanging
Condition of Discharge Channel	Remove 1 large pine tree leaning over channel.

NOTE: Discharge channel drops off at 10% beyond outlet of conduit. Channel is paved with concrete at the outlet of the conduit. There is no stilling basin or energy dissipation devices. No scour or undercutting of headwall was noted.

July 17, 1974

REPORT OF ANNUAL INSPECTION

Clam River Watershed
Massachusetts

On July 16, 1974, the following met at West Lake Site, Clam River Watershed, in the town of Sandisfield, Massachusetts, for the purpose of conducting the annual inspection of the West Lake Site, the Abbey Site, the South Silver Site and the North Silver Site:

Kevin Maguire, Water Resources Commission, Boston, MA
Carl Curtin, Dept. of Natural Resources, Pittsfield, MA (DF&P)
Roger Northrup, Mass. Dept. of Public Works, Lenox, MA
Paul Fezzie, Mass. DPW, Lenox, MA
Cecil B. Currin, Soil Conservation Service, Amherst, MA
James J. Elasmir, Soil Conservation Service, Otis, MA
Ronald E. Thompson, Soil Conservation Service, Pittsfield, Mass.

GENERAL

The Massachusetts Department of Natural Resources is responsible for the operation and maintenance of the sites.

Structural Conditions and Recommendations

WEST LAKE SITE

1. Trees and shrubs should be removed from the emergency spillway.
2. Remove trees and shrubs from slopes of dam and around the outlet channel.
3. Remove logs and debris from around the trash racks.

ABBEY SITE

1. Branches and other debris around the riser should be removed.
2. Remove shrubs and trees from the slopes of dam.
3. Mow small area upstream of the dam.
4. The concrete and the channel riprap look good.

NORTH SILVER SITE

1. Remove logs and other debris from trash racks and from edges of permanent pool.
2. Remove logs from toe of dam.
3. Concrete at the riser and outlet channel look good.

SOUTH SILVER SITE

1. Access road and ditches should be regraded.
2. Culverts need to be cleaned.
3. Debris should be removed from trash racks of the riser and from the edges of the pool.
4. Remove boulders from emergency spillway.
5. Concrete in the riser looks good.

AL

OPERATION AND MAINTENANCE
INSPECTION RECORD

U.S. Dept. of Agriculture
Soil Conservation Service

CL 9M Inspection Date 4/26/70

/No. North Solar Type Multi-purpose

Inspection: Special ☐ Structure Operation: Satisfactory ☒

Annual ☒ Unsatisfactory ☐

g Local Organization: Berkshire Conservation District, Water Res. Comm.

or Inspection: Doug Blend (DEM), Carl Custer (DEM), Ernie Sturges (WRS)

Penny (SSS), Ron Thompson (SSS)

	Condi- tion * S or U	Maintenance & Needed Repairs	Esti- mated Costs	Agreed Date Repairs to be Completed
ation	S	fertilize by plowing + sump 7-20-70 400 lb. / ft	\$1000	7/
s	S		—	21/
ipal way	U	clean up debris around high water mark + trash vol	\$100	
gency lway	S	Remove Trash	\$100	76
nkment rap	S			
rvoir	S			
s or es	S			
et nels	S			
cture nage ets	S			
ss Rd.	S			
		TOTAL	\$1200	

(over) S = Satisfactory; U = Unsatisfactory

B2-8

1814 *Walter R. P... Ernest Sturges*

Project Allen River W/S Inspection Date 4/26/77
 Site Name/No. North Silver Type Multi-Purpose
 Type of Inspection: Special ☐ Annual ☒ Structure Operation: Satisfactory ☒ Unsatisfactory ☐
 Sponsoring Local Organization: Berkshire Conservation District W.R.C.
 Present for Inspection: Emmet Thompson (W.R.C.) Ronald Thompson, James
McLennan (SCS)

ITEM	Condi- tion S or U	Maintenance & Needed Repairs	Esti- mated Costs	Agreed Date Repairs to be Complete
1. Vegetation		TOP DOWN - 10-10-10 Felling. DIP L... .. 10 20 30 F... ..	\$ 1200.00	
2. Fences	S			
3. Principal Spillway	U	Clean debris, high water mark and pour trash racks	\$ 300.	7/77
4. Emergency Spillway	S	Remove debris	\$ 300.00	"
5. Embankment & Riprap	S	Clean w/ logs, high water mark	\$ 500.00	"
6. Reservoir Area	S	Remove logs and debris W/S toe of dam, + along north slope	\$ 500	"
7. Gates or Valves	S			
8. Outlet Channels	S			
9. Structure Drainage Outlets	S			
10. Access Rd.	S			
11.			\$ 3,700.00	

REMARKS: (over)

S = Satisfactory; U = Unsatisfactory

Existing water in reservoir above high water mark.

Ronald Thompson
 (District Conservation Officer / Project Engineer)
 (Report due annually: July 1)

Emmet Thompson
 (W.R.C. Representative)

29 College Street, P. O. Box 848, Amherst, Massachusetts 01002

TO: Arthur B. Holland, Head
Engineering and Watershed
Planning Unit
Soil Conservation Service
Broomall, Pa.

B2-6

3/22/76

INSPECTION REPORT

Project CLAM RIVER WATERSHED Inspection Date 10-4-78
 Site Name/No. NORTH SILVER Type MULTI-PURPOSE
 Type of Inspection: Special ☐ Annual ☒ Structure Operation: Satisfactory ☒ Unsatisfactory ☐

Sponsoring Local Organization: BERKSHIRE CONSERVATION DISTRICT, WRC
 Present for Inspection: Eric Stuyvesant, Thomas F. Doucette, WATER RESOURCES,
RAY CURRAN JR, Viscas Johannes, Ronald Thompson, JAMES ELASMAR
S.C.S.

ITEM	Condi- tion * S or U	Maintenance & Needed Repairs	Esti- mated Costs	Agreed Date Repairs to be Completed
1. Vegetation	S	FERTILIZE ^{up slope of DAM} 10-12-20 - 400 #/acre	700 -	APRIL 1979
2. Fences	S			
3. Principal Spillway	S	REMOVE DEBRIS FROM TRAIN RACK	10 -	APRIL 1979
4. Emergency Spillway	S	LIME + FERTILIZE ^{TO TOP OF} 400 #/acre 20-20	300 -	APRIL 1979
5. Embankment & Riprap	S			
6. Reservoir Area	S			
7. Gates or Valves	S	PAINT STEM	20 -	APRIL 1979
8. Outlet Channels	S	CUT OUT BRUSH - TRIM WITH BRUSH	350 -	APRIL 1979
9. Structure Drainage Outlets	S			
10. Access Rd.	S			
11. ENTRANCE GATE	S	REPAIR CABLE	100 -	APRIL 1979

REMARKS: (over)

S = Satisfactory; U = Unsatisfactory

Ronald Thompson
 (District Conservationist) (Project Engineer)
 (Report due annually July 1)

Thomas F. Doucette
 (SLO Representative)

Project CLAM RIVER WATERSHED Inspection Date 10/30/79Site Name/No. NORTH SILVER Purpose MULTI-PURPOSEType of Inspection: Special ☐ Annual ☒ Structure Operation: Satisfactory ☒ Unsatisfactory ☐Sponsoring Local Organization: BERKSHIRE CONSERVATION DIST., W.F.C.Present for Inspection: T. DOWDIE - W.F.C. - CALL CURTIN, FRED RANDO, DEAN C. CURRIN, G. PACKER, R. CURRAN - SCS

ITEM	Condition * (S or U)	Maintenance & Needed Repairs	Estimated Costs	Agreed Date Repairs to be completed
1. Vegetation	S			
2. Fences	S			
3. Principal Spillway	S	REMOVE DEBRIS FROM TRASH RACK	50	APRIL 1980
4. Emergency Spillway	S	MOW BTA OF E.S.	150	APRIL 1980
5. Embankment & Riprap	S	MOW TOP OF DAM CUT OUT WOODY VEGETATION	350	APRIL 1980
6. Reservoir Area	S	PICK UP DEBRIS AROUND SHORELINE	300	APRIL 1980
7. Gates and Valves	S			
8. Outlet Channels	S			
9. Structure Drainage Outlets	S	LEFT WING WALL & TOP HEADWALL HAVE MINOR CRACKS - NO REPAIR NECESSARY AT THIS TIME CHECK SETBACK LEFT OF WING WALL		
10. Access Rd.	S			
11. ENTRANCE GATE	S	REPAIR CABLE, MOVE FENCE GATE	200	APRIL 1980

REMARKS: (over)

* S = Satisfactory; U = Unsatisfactory

Sam Hark (District Conservationist)

(Project Engineer)

(SLO Representative)

Project CLAM RIVER WATERSHED Inspection Date 4/28/80
 Site Name/No. NORTH SILVER Type MULTI-PURPOSE
 Type of Inspection: Special ☐ Annual ☒ Structure Operation: Satisfactory ☒ Unsatisfactory ☐
 Sponsoring Local Organization: Berkshire Conservation District, W.R.C.
 Present for Inspection: E. STRUBBER, DNR, R. CURRAN E.C.S.
C. CURTIN, DNR.

ITEM	Condi- tion * S or U	Maintenance & Needed Repairs	Esti- mated Costs	Agreed Date Repairs to be Complete
1. Vegetation	S			
2. Embankment	S	W/STAKE, RT SIDE → PLACE STONE IN SLOPES	300	
3. Principal Spillway	S	CLEAN DEBRIS GROTES FITTING, ON 172 IN.	200	
4. Emergency Spillway	S	MOW GRASS	300	
5. Embankment & Riprap	S	PLACE GRAVEL ON T.O.D. 500 yd AND SLOPES (U.S.D/S)	\$300 \$1200	
6. Reservoir Area	S	REMOVE DEBRIS FR. SLOPES & EMBANKMENT	300 300	
7. Gates or Valves	S			
8. Outlet Channels	S			
9. Structure Drainage Outlets	S	REMOVE STONE IN CHANNEL	\$100	
10. Access Rd.	S			
11. ENTRANCE GATE	S	MOVE GATE TOWARD, T.O.D. & REPAIR ENTRANCE	1500	

REMARKS: (over)

S = Satisfactory; U = Unsatisfactory

[Signature] (District Conservationist) [Signature] (Project Engineer) [Signature] (SLO Representative)
 (Report due, annually: July 1)

Engineering Report on North Silver Site
Clam River Watershed

May 5, 1978

The NETSC requested that risers with transitions be inspected for cracking. (Letter dated August 10, 1977). On August 30 and 31, 1977, personnel from the Massachusetts State Office and the Otis field office inspected two risers in Massachusetts. The results of this inspection are outlined in a letter dated September 26, 1977.

A meeting was held in Broomall, Pa. on December 14, 1977. At this meeting R. Fronk requested that the North Silver Riser be evaluated by the Massachusetts design section. (Minutes of Meeting, December 14, 1977). This evaluation was to be similar to that done for the Clam Lake Riser by E. Alling, dated November 23, 1977.

Conditions of the Riser

The inspection of the riser shows that there are hairline cracks in the transition walls. These cracks are located approximately in the same location as the cracks in the Clam Riser. (See photos taken August 30, 1977). These cracks are very thin and show no signs of movement in the last few years. This is based on the fact that the cracks are filled with a mineral deposit and do not have any rust deposits exposed on the concrete surface. It was the opinion of those investigating the riser that what cracking is present had occurred immediately after or during construction. The riser shows no sign of cracking in the sections above the transition. Some weathering of concrete was noted, but is not a problem.

Original Design

The North Silver riser was designed in a different manner than Clam River. A concrete yoke was designed to give simple support to the sidewalls in the plane of the downstream endwall. This feature combined with an endwall at the upstream end makes the basic design assumptions acceptable. Clam Site was designed without a yoke and with an upstream gate chamber.

The vertical steel in the sidewall at the North Silver Site is adequate to resist the moment developed by the loading on the D.S. face of the riser. (See attached computations).

Conclusions

The use of a yoke and heavy reinforcing #11 @ 6" on the sidewalls was sufficient to prevent serious cracking from developing at the North Silver Site. Also, the riser is located in the side slope of the dam and not on a berm. It is possible that the location is such that earth pressures are developed on the U. S. face. It is recommended that the structure be inspected at least once every two years to insure that no further cracks develop.

Prepared by:

Chester H. Dodge, Jr., Design Engineer

Concurred by:

Cecil B. Currin, St. Cons. Engineer

-2-
O&M INSPECTION RECORD
CHECK LIST

The items to be checked at time of inspection may include, but not be limited to, the following:

1. Vegetation
 - a. Need for cutting &/or spraying
 - b. Need for reseeding, fertilizing, liming
 - c. Evidence of winter injury, insect damage, disease.
 - d. Need for mowing and removal of excess mowed vegetation.
 - e. Other _____
2. Fences
 - a. Loose or damaged posts
 - b. Loose or broken wires
 - c. Accumulated debris in fence
 - d. Condition of gates and cables
3. Principal Spillway
 - a. Obstructions in spillway
 - b. Condition of outlet and riser
 - (1) Signs of seepage
 - (2) Separation of joints
 - (3) Cracks, breaks, or deterioration of concrete
 - (4) Differential settlement
 - c. Sediment level in relation to the top of riser
 - d. Scour at outlet
 - e. Condition of trash racks
4. Emergency Spillway
 - a. Erosion
 - b. Sedimentation
 - c. Weeds, logs, or other obstructions, reducing channel capacity
 - d. Deposition or sloughing
 - e. Drainage problems
 - f. Seeps
5. Embankment and Riprap
 - a. Settlement or cracking
 - b. Erosion
 - c. Leakage
 - d. Rodent, wildlife, or livestock damage
 - e. Wave damage
6. Reservoir Area
 - a. Undesirable vegetative growth
 - b. Cut or fallen trees
 - c. Slash and other debris
 - d. Erosion of banks
7. Gates and Valves
 - a. Damage by debris, ice freezing, rust or corrosion
8. Channels
 - a. Sedimentation
 - b. Bank cutting
 - c. Debris accumulation
 - d. Condition of riprap or other works of improvement
 - (1) Undermining
 - (2) Damage or deterioration
 - (3) Adjacent channel scouring
 - e. Adjacent property damage
9. Structure Drainage Outlets
 - a. Drainage outlet pipes
 - (1) Clean or dirty water
 - (2) Rodent guard attached and functioning
 - (3) Pipes free flowing, no obstructions
 - (4) Evidence of seepage
 - (a) Adjacent to pipes
 - (b) Lower 1/3 downstream slope & flood plain
 - b. Rock toe drains
 - (1) Free draining into stilling basin or collection channels
 - (2) Clean or dirty water
10. Access Roads
11. Safety Hazards
12. Signs
13. Vandalism

REMARKS: (continued)

Distribution: Sponsors: Mass. Div. of Water Resources, FmHA (if loan involved), SCS

PREVIOUS INSPECTION REPORTS

- A. USDA, Soil Conservation Service performs annual inspections and interim site visits after severe storms, as well as engineering associated with the operation and maintenance of the dam. Sample copy of O & M Inspection Record Checklist, Annual O & M Inspection Records, Selected Engineering Reports, Correspondence, and Interim Inspection Reports are attached.
- B. Inspections of dams were performed by the Massachusetts Department of Public Works, District 1, and reports are on file at District 1 Headquarters, Pittsfield-Lenox Road, Lenox, MA - Selected Reports Attached.

LIST OF AVAILABLE DESIGN
CONSTRUCTION AND MAINTENANCE RECORDS

- A. The original Design file, Geologist's Report, Specifications, Construction Records, and As-Built Plans are available from the U.S. Department of Agriculture, Soil Conservation Service, 29 Cottage Street, Amherst, MA 01002.

Construction records and plans are also on file with the Massachusetts Department of Environmental Management Division of Water Resources, 100 Cambridge Street, Boston, MA 02202.

- B. Maintenance records, including annual Operation and Maintenance Inspection Records, Annual Maintenance Contracts, and Correspondence, are available from the Division of Water Resources in Boston. Copies are also on file at the SCS office in Amherst.

APPENDIX B

ENGINEERING DATA

- B-1. LIST OF AVAILABLE DESIGN, CONSTRUCTION
AND MAINTENANCE RECORDS
- B-2. PREVIOUS INSPECTION REPORTS
- B-3. PLANS, SECTIONS AND PROFILES
- B-4. BORING LOGS

VISUAL INSPECTION CHECKLIST

DAM: North Silver Dam MA 00307

DATE: June 10, 1980

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	There is no service bridge. Access to gate operator on top of the riser is by way of a metal ladder on the upstream side of riser. Ladder is secure.
a. Super Structure	
Bearings	
Anchor Bolts	
Bridge Seat	
Longitudinal Members	
Under Side of Deck	
Secondary Bracing	
Deck	
Drainage System	
Railings	
Expansion Joints	
Paint	
b. Abutment & Piers	None
General Condition of Concrete	
Alignment of Abutment	
Approach to Bridge	
Condition of Seat & Backwall	

VISUAL INSPECTION CHECKLIST

DAM: North Silver Dam MA 00307

DATE: June 10, 1980

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u>	Includes emergency spillway in earth and rock cut at south abutment.
a. Approach Channel	
General Condition	Good; minor debris
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Approach Channel	OK. Well graded; grassed. Wheel tracks in approach channel - level section is OK.
b. Weir and Training Walls	No training walls
General Condition of Concrete	Concrete weir at control section is good.
Rust or Staining	None
Spalling	None
Any Visible Reinforcing	None
Any Seepage or Efflorescence	None
Drain Holes	None required
c. Discharge Channel	
General Condition	Exit channel downstream of control section is OK.
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	Yes. Downstream of exit channel emergency overflow would go into woods.
Floor of Channel	Floor of exit channel is OK.
Other Obstructions	Ground slope in woods downstream of emergency spillway exit channel is steep.

Aggronomic Conditions and Recommendations

ABBEY SITE

Vegetation on the dam looks very good and is providing very effective cover. Dam top and spillway should be mowed and should be fertilized with 600 pounds of 5-10-10 or equivalent. At least 25% should be derived from an organic source.

WEST LAKE SITE

Willows and aspen 3 to 5 feet tall have become established within the rock riprap, primarily on the north side of the dam. These should be removed along with the dead material along the water line.

Vegetation on the dam is in good shape. Predominant cover is crown-vetch and it does not require mowing. The top of dam and the spillway should be mowed and fertilized with 600 pounds of 5-10-10 or equivalent. At least 25% should be derived from an organic source. The area should also be limed at a rate of two tons/acre to maintain desirable soil pH.

NORTH SILVER SITE

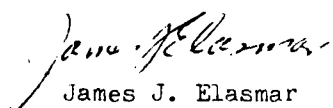
Vegetation is not as good as on the other sites. The site should be limed with two tons/acre and fertilized with 600 pounds of 10-10-10 or equivalent. The top of dam and spillway should be mowed.

The scar from the "slip area" is still visible. The area should be reseeded after lime and fertilizer is spread.

SOUTH SILVER SITE

Vegetation is in good condition and does not appear to need lime and fertilizer. The top of dam and spillway should be mowed. Trash at the water's edge should be removed.

The dam top and spillway should be limed at a rate of two tons/acre and fertilized with 600 pounds of 5-10-10 or equivalent to maintain soil fertility.


James J. Elasmr
Project Engineer
SCS, Otis, Mass.

Ronald Thompson
District Conservationist
SCS, Pittsfield, Mass.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

File
PL566
Eng 6-7

SUBJECT: Inspection - Clam River W/S, Bradley Brook W/S,
Washington Mountain Brook W/S

DATE: January 2, 1974

TO: Donald L. Basinger, State Conservation Engineer,
Amherst, Ma. 01002

On December 21, 1973 an inspection was made of the following sites to determine the effect of a 3" rainfall had on the structures.

West Lake Site Water level one (1) foot below the high stage orifice. Pond was covered over with ice. Condition normal for this time of year.

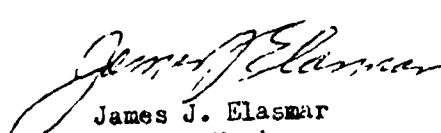
Abbey Lake Site Water level one (1) foot over low stage. Pond covered with ice. No problem here.

North Silver Site Water level at low stage, pond covered by ice. No problem here. Condition normal.

South Silver Site Water level one (1) foot above low stage. Pond covered with ice. Condition normal for this time of year.

Black Brook Site Water level just above low stage. Ice covers pond. Condition normal for this time of year.

Washington Mountain Lake Site Gate open, water level top of 20" pipe. No damage of any kind to structure.


James J. Elasmur
Project Engineer

cc: E. G. Konieczny
W. F. Warren

Trees and shrubs should be removed from the riprap area by pulling or by cutting and treating the stumps to prevent resprouting. The tree seedlings that are becoming established in the seeded area between the maintenance shed and West Lake should also be pulled out.

Lime at the rate of 2 tons per acre on all legume and grass areas to help to maintain desirable soil pH. Fertilize these areas with 600 pounds, 5-10-10 or 400 pounds, 8-16-16, or equivalent. It is desirable to maintain fertility for the growth of grasses and legumes. At least 25% of the nitrogen should be derived from an organic source.

Improvement of the roadway below the dam is needed for recreation uses and for access to the Abbey Lake Site. A bridge or culvert in the outlet channel is needed to cross the stream. Because the roadway on both sides of the stream is wet, roadside drains and a gravel base are required to develop it for recreation uses and as an access road to the Abbey Lake Site.

ABBEY LAKE SITE

Structural Conditions and Recommendations

Branches and other debris around the riser should be removed. Ditch along the access road needs to be regraded and a large tree should be removed from this road. Culverts need to be cleaned. The concrete and the channel riprap look very good.

Agronomic Conditions and Recommendations

A very effective mulch cover has been created by crownvetch and birdsfoot trefoil. The birdsfoot trefoil appears to be spreading and growing as well as the crownvetch. The mulch created by the birdsfoot trefoil, however, is not as thick.

An application of 2 tons of ground limestone and 600 pounds of 5-10-10 or 400 pounds of 8-16-16 or equivalent, per acre, will help to maintain soil pH and fertility for legumes. Part of the nitrogen, at least 25%, should be derived from an organic source.

NORTH SILVER SITE

Structural Conditions and Recommendations

Remove logs along toe of dam and from trash rack of riser. Sloughed area from Sta 53+50 to Sta 55+00 has stabilized itself. It is recommended to seed sloughed area from Sta 66+00 to Sta 67+25. This area is a little worse than it was a year ago. See recommended seeding rates given below.

Agronomic Conditions and Recommendations

Grasses growing on the water side of the dam are spindly. Several bare spots, also on the water side of the dam, were observed. The White and Alsike clover strips observed last spring are not as prominent as they were last year. There is a pathway on top of the dam.

Erosion was observed in the lower portion of the "slip" area from Sta 66+00 to Sta 67+25. The openings created by the "slip" remain devoid of vegetation. Except for the "slip" area, the grasses on the back slope of the dam are doing an effective job in controlling erosion.

Because of the steep slope of the dam, it is not possible to mow it with tractor mowers. Red Fescue, Tall Fescue, and Timothy were observed growing on the dam. Vegetation in the vicinity of the parking area was mostly crown-vetch.

Repair of the "slip" area is needed to prevent erosion and to improve the appearance. Fertilize bare areas, prior to seeding, with 600 pounds of 10-10-10 per acre or the equivalent. At least 25% of the nitrogen should be derived from an organic source. Reseed bare parts of the "slip" area with the same seed mixture as that used originally and at the same amounts of the mixture per acre.

Topdressing with a complete fertilizer, such as 600 pounds of 10-10-10 per acre, or equivalent, is recommended to provide fertility for the growth of grasses. At least 25% of the nitrogen should be derived from an organic source.

Mow after July 1.

SOUTH SILVER SITE

Structural Conditions and Recommendations

Erosion was noted in the emergency spillway at the end of the dike. This area is the same as it was a year ago. The access road and the ditches should be regraded. The culverts need to be cleaned. Debris should be removed from the trash rack of the riser and from the edges of the pool. The concrete in the riser looks good.

Agronomic Conditions and Recommendations

Erosion that took place several years ago created rills on the steep southerly slope (above the emergency spillway). Rills have shingled themselves and no apparent active erosion is taking place on the steep slope.

The sod in the vegetated spillway is weak. Vegetation on the dam is very good -- predominately crownvetch.

Rill erosion has taken place at the outlet of the vegetated spillway. Natural shingling has taken place with no apparent new erosion.

Because the southerly slope is too steep to mow, it is recommended that flowering wildlife shrubs be planted on this slope above the elevation of the top of the dam. Group plantings of Autumn Olive, Highbush Cranberry, and Red-Red Honeysuckle will further enhance the wildlife habitat of this site.

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE , 29 Cottage Street, Amherst, Massachusetts 01002

SUBJECT: ENG 12 (PL-566), North Silver Site, Clam River Watershed, Berkshire County DATE: May 25, 1972

TO: Donald L. Basinger, State Conservation Engineer
SCS, Amherst, Massachusetts

I have visited the North Silver Site and from a visual inspection believe that some action has taken place at slide Areas #1 and #2 this spring. At Area #1 this is very minor and hardly detectable. At Area #2 I doubt if any more slips have developed, but those that existed last summer have progressed to the bottom of the slope and are raw at their headwalls.

The slopes are saturated to the retreating frost line and in my opinion at the existing side slope and exposures surface slips will occur to some extent each spring even if good vegetative cover can be obtained.

Corrective measures are:

- (a) Flattening the slopes with compacted fill to provide stability for the rapid draw down condition (3:1 recommended)
- (b) Covering the existing slope with a weight (clean gravel and cobbles or riprap placed over a filter) to hold the slip prone material in place.

As both the above solutions are very expensive, the recommendation of the maintenance inspection team that the revegetative contract be tried has merit. The Service could go along with revegetating provided that all concerned realize that success is not certain. I believe Area #1 should also be included in the vegetative contract primarily for aesthetic reasons as the scars are clearly visible from the road.

Donald M. Stockwell
Design Engineer

cc: D. Stockwell
ENG File

DMStockwell:ntl

An effective grass cover is also present in the emergency spillway. Rill erosion at the outlet of the emergency spillway is being controlled by the natural shingling of flat stones. Placement of clumps of myrtle (periwinkle) along the edges of the outlet will improve the appearance of the outlet. (12 to 15 clumps of myrtle 6" square are suggested).

Overall fertilization of the dam and emergency spillway with a complete fertilizer such as 400 pounds per acre of 7-7-7 or 300 pounds of 10-10-10 will thicken the sod.

Rill erosion on the southerly slope below the diversion has eroded the soil exposing either large rocks or bedrock. It is suggested that no further attempt to seed grasses be made in this area. Transplanting clumps of native cinquefoil, low growing blueberries and similar vegetation at the edge of the eroded areas will improve the appearance of the site.

NORTH SILVER SITE

Structural Conditions and Recommendations

Remove stump and logs along toe of dam. It was recommended to seed sloughed areas from Sta. 53 $\frac{1}{2}$ 50 to Sta. 55 $\frac{1}{2}$ 00 and from Sta. 66 $\frac{1}{2}$ 00 to Sta. 67 $\frac{1}{2}$ 25 on the downstream side of the dam, without any disturbance of existing sod.

The concrete looks satisfactory. The site in general looks very good.

Agronomic Conditions and Recommendations

Grasses growing on the dam are thin and not very healthy-weak sod. Strips of White and Alsike clover about 20 feet wide and about 30 feet apart up and down the upstream slope of the dam were observed to be growing very well. Some winter killing of grass was observed on top of the dam. Water setting in pockets on top of the dam contributed to the winter injury. The pockets should be filled with loam limed, fertilized and seeded to Red Fescue.

A thicker sod on the dam can be created by topdressing with a fertilizer containing about 75% organic nitrogen (600 pounds per acre of 10-5-5 with 75% organic nitrogen or equal).

In spite of the weak sod cover, suprisingly very little erosion has taken place on the dam.

1. ENG 12 - Clam River Watershed, North Silver Site, DATE: September 3, 1971
Berkshire County, Mass.

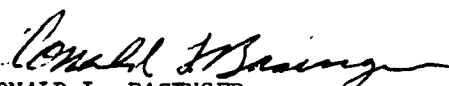
2. Dr. Benjamin Isgur
State Conservationist
SCS, Amherst, Mass.

During an inspection in the spring of 1971, it was discovered that there were two surface-slip areas on the downstream face on the dam. The total area involved does not exceed one half acre. These surface slips were preceded by a long wet period. When the soil material flowed down the slope, it carried the vegetation with it -- thereby leaving random bare areas which need vegetating again. These areas slid during the first wet period following construction.

It has been mutually determined between the Sponsor and SCS that the work required is "Major Repair," rather than normal maintenance. These areas are now considered critical areas. The work should be done immediately in order to obtain a vegetative cover this fall.


We have prepared a drawing and specifications to accomplish this work. The cost estimate is \$ 640. The Division of Water Resources can contract this job without formal advertising.

Reference is made to paragraph 115.06 of the Watershed Protection Handbook. This paragraph allows the State Conservationist to approve cost sharing additional work required to obtain an adequate vegetative cover during the three-year establishment period. The work that we propose is for the purpose of obtaining an adequate vegetative cover.


DONALD L. BASINGER
State Conservation Engineer

cc: C. E. Mills
A. Verdi
C. Moustakis

APPROVED:


Dr. Benjamin Isgur
State Conservationist

Date: 9/13/71

1971

REPORT OF ANNUAL INSPECTIONCLAM RIVER WATERSHED

May 21, 1971

On May 18, 1971 the following met at the West Lake Site, Clam River Watershed in the town of Sandisfield, Massachusetts for the purpose of conducting the annual inspection of the West Lake Site, The abby Site, The South Silver Site and the North Silver Site:

E.T. Lewicke, Water Resources Commission
K. Maguire, Water Resources Commission
Douglas Poland, Natural Resources Commission
Stetson Adams, Department of Natural Resources
Douglas Lyman, Department of Natural Resources
Karl Klingelhofer, Soil Conservation Service
Don Basinger, Soil Conservation Service
Gene Mills, Soil Conservation Service
John Folan, Soil Conservation Service
James Elasmur, Soil Conservation Service
Edward Konieczny, Soil Conservation Service

NORTH SILVER SITE

The appearance of the vegetative cover looks good. It is recommended that dam area be fertilized with 10-10-10 at the rate of 600 lbs per acre. Erosion at the inlet of the emergency spillway should be repaired. It was noted that the downstream slope of the dam from stations 53 + 50 to station 55 + 00 and from station 66 + 00 to station 67 + 25 had sloughed. These areas should be repaired as soon as possible to prevent further damage to this slope. Low spots on top of the dam should be filled.

Branches and other debris around the riser should be removed so as not to plug the outlet. The concrete in the riser and outlet channel looks good. Job as a whole looks very good.

The Massachusetts Department of Natural Resources is responsible for the operation and maintenance of this site.

Submitted by James J. Elasmur and

James J. Elasmur
Project Engineer

Edward Konieczny
District
Conservationist

INSPECTION

REPORTS

MASSACHUSETTS DEPARTMENT OF

PUBLIC WORKS

APPENDIX B2-B

INSPECTION REPORT - DAMS AND RESERVOIRS

1. Location: City/Town SANDISFIELD Dam No. 1-2-280-13
 Name of Dam North Silver Site Inspected by RD Jordan - R Nordrup

Date of Inspection September 15, 1977

Previous Inspection June 23, 1975

2. Owner/s per: Assessors _____
 Reg. of Deeds _____ Personal Contact _____

1. Water Resources Commission Boston
Name St. & No. City/Town/State Dam No.

2. _____
Name St. & No. City/Town/State Dam No.

3. Caretaker (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Name St. & No. City/Town/State Dam No.

4. No. of Pictures taken 1

5. Degree of Hazard: (If dam should fail completely)*

1. Minor X 2. Moderate _____

3. Severe _____ 4. Disastrous _____

*This rating may change as land use changes (future development)

6. Outlet Control: Automatic _____ Manual X

Operative X Yes _____ No _____

Comments: _____

7. Upstream Face of Dam:

Condition: 1. Good X 2. Minor Repairs _____

3. Major Repairs _____ 4. Urgent Repairs _____

Comments: _____

DAM NO. 1-2-260-13

8. Downstream Face of Dam:

Condition: 1. Good X 2. Minor Repairs _____
3. Major Repairs _____ 4. Urgent Repairs _____

9. Emergency Spillway

Condition: 1. Good X 2. Minor Repairs _____
3. Major Repairs _____ 4. Urgent Repairs _____

Comments: _____

10. Water level at time of inspection 13'± above _____ below X
top of dam _____
principal spillway X
other _____

11. Summary of Deficiencies Noted:

NONE Growth (Trees & Brush) on Embankment _____
" Animal Burrows and Washouts _____
" Damage to slopes or top of dam _____
" Cracked or damaged masonry _____
" Evidence of seepage _____
" Evidence of piping _____
" Erosion _____
" Leaks _____
" Trash and/or debris impeding flow _____
" Clogged or blocked spillway _____
" Other _____

- 3 -

Remarks & Recommendations; (Fully Explain)
PREVIOUS INSPECTION DATE: JUNE 23, 1975

The eroded area previously reported, has been returned, and is good condition.

No deficiencies were noted at this inspection.

For location See Topo Sheet 6-D.

3. Overall Condition:

- X 1. Safe _____
- - 2. Minor repairs needed _____
- - 3. Conditionally safe - major repairs needed _____
- - 4. Unsafe _____
- - 5. Reservoir impoundment no longer exists (explain) _____
- - Recommend removal from inspection list _____

INSPECTION REPORT - DAMS AND RESERVOIRS

Location: City/Town SANDISFIELD

Dam No. 1-2-260-13

Name of Dam North Silver Site

Inspected by: RD Jordan-PFessle

Date of Inspection 6/23/75

Inspector/s: per: Assessors _____

Prev. Inspection X

Reg. of Deeds _____

Pers. Contact _____

Owner Resources Commission

Boston, MA

Name _____ St. & No. _____ City/Town _____ State Tel. No. _____

Name _____ St. & No. _____ City/Town _____ State Tel. No. _____

Name _____ St. & No. _____ City/Town _____ State Tel. No. _____

Operator [if any] e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Name _____ St. & No. _____ City/Town _____ State Tel. No. _____

Number of Pictures taken 2

Degree of Hazard: [if dam should fail completely]*

1. Minor X
2. Moderate _____
3. Severe _____
4. Disastrous _____

Is rating may change as land use changes [future development]

Gate Control: Automatic _____ Manual X

Operative X yes: _____ no.

Comments: _____

Stream Race of Dam: Condition:

1. Good X
2. Minor Repairs _____
3. Major Repairs _____
4. Urgent Repairs _____

Comments: _____

Ream Face of Dam: Condition: 1. Good _____. 2. Minor Repairs X.
3. Major Repairs _____. 4. Urgent Repairs _____.

Comments: Erosion

Spillway: Condition: 1. Good _____. 2. Minor Repairs _____.
3. Major Repairs _____. 4. Urgent Repairs _____.

Comments: _____

Level @ time of inspection: 17± ft. above _____. below X _____.
top of dam _____.
principal spillway overflow.
other _____.

Types of Deficiencies Noted:

Growth [Trees and Brush] on Embankment _____
Animal Burrows and Washouts _____
Damage to slopes or top of dam X _____
Cracked or Damaged Masonry _____
Evidence of Seepage _____
Evidence of Piping _____
Erosion _____
Leaks _____
Trash and/or debris impeding flow _____
Logged or blocked spillway _____
Other _____

CLAM RIVER WATERSHED PROJECT NORTH SILVER MAP

DRAINAGE AREA
TOTAL STORAGE
FLOODWATER RETARDING STORAGE
WATER SURFACE AREA
HEIGHT OF DAM
VOLUME OF FILL

BUILT UNDER THE WATERSHED PROTECTION AND
FLOOD PREVENTION ACT

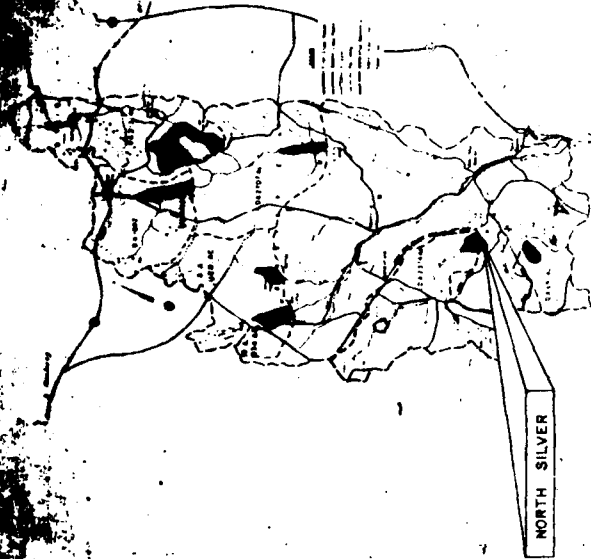
by
MASSACHUSETTS WATER RESOURCES COMMISSION

and
BERKSHIRE CONSERVATION DISTRICT
with the assistance of
SOIL CONSERVATION SERVICE

of the
UNITED STATES DEPARTMENT OF AGRICULTURE
1968

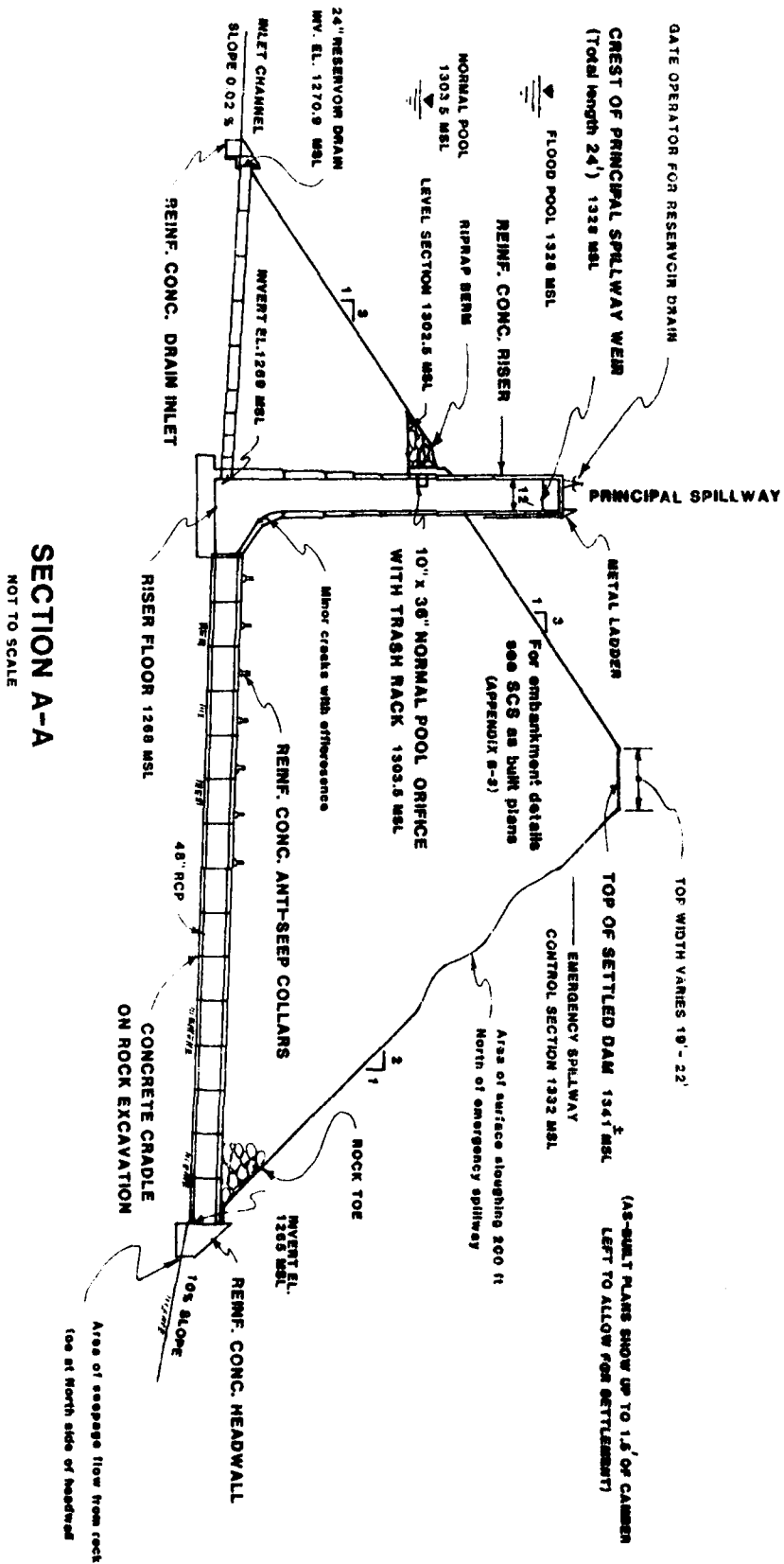
INDEX

- SHEET 1 COVER SHEET
- SHEET 2 PLAN OF DAMSITE AND STORAGE AREAS
- SHEET 3 AERIAL VIEW OF STORAGE & BORROW AREAS
- SHEET 4 PLAN OF DAMSITE
- SHEET 5 PROFILE & SECTION
- SHEET 6 PLAN OF TRENCH
- SHEET 7 PLAN PROFILE OF PRINCIPAL SPILLWAY
- SHEET 8 MISCELLANEOUS DETAILS
- SHEET 9 PRINCIPAL SPILLWAY DETAILS
- SHEET 10 ROCK TREATMENT DETAILS
- SHEET 11 RISER DETAILS
- SHEET 12 RISER DETAILS
- SHEET 13 RISER DETAILS
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- SHEET 99 RISER DETAILS
- SHEET 100 RISER DETAILS



CLAM RIVER WATERSHED PROJECT	
NORTH SILVER WATERSHED PROJECT DAM	
DATE: 1968	
COVER SHEET	
U.S. DEPARTMENT OF AGRICULTURE	
SOIL CONSERVATION SERVICE	
C. DODGE 1-8 4-67	
E. B. SINK 4-67	
CLAM RIVER WATERSHED PROJECT	

AS BUILT



NOTE: The above section is a tracing from as built plans prepared by the U.S. Dept. of Agriculture. Soil Conservation Service entitled "Clam River Watershed Project, North Silver Multiple-Purpose Dam."

NOTE: Schematic Layout Assembled and elevation datum taken from plans prepared by U.S. Dept. of Agriculture, Soil Conservation Service entitled "Clam River Watershed Project North Silver Multiple-Purpose Dam."



APPENDIX B-3 FIGURE 1

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS

ROBERT G. BROWN & ASSOCIATES, INC.
Pittsfield, Massachusetts

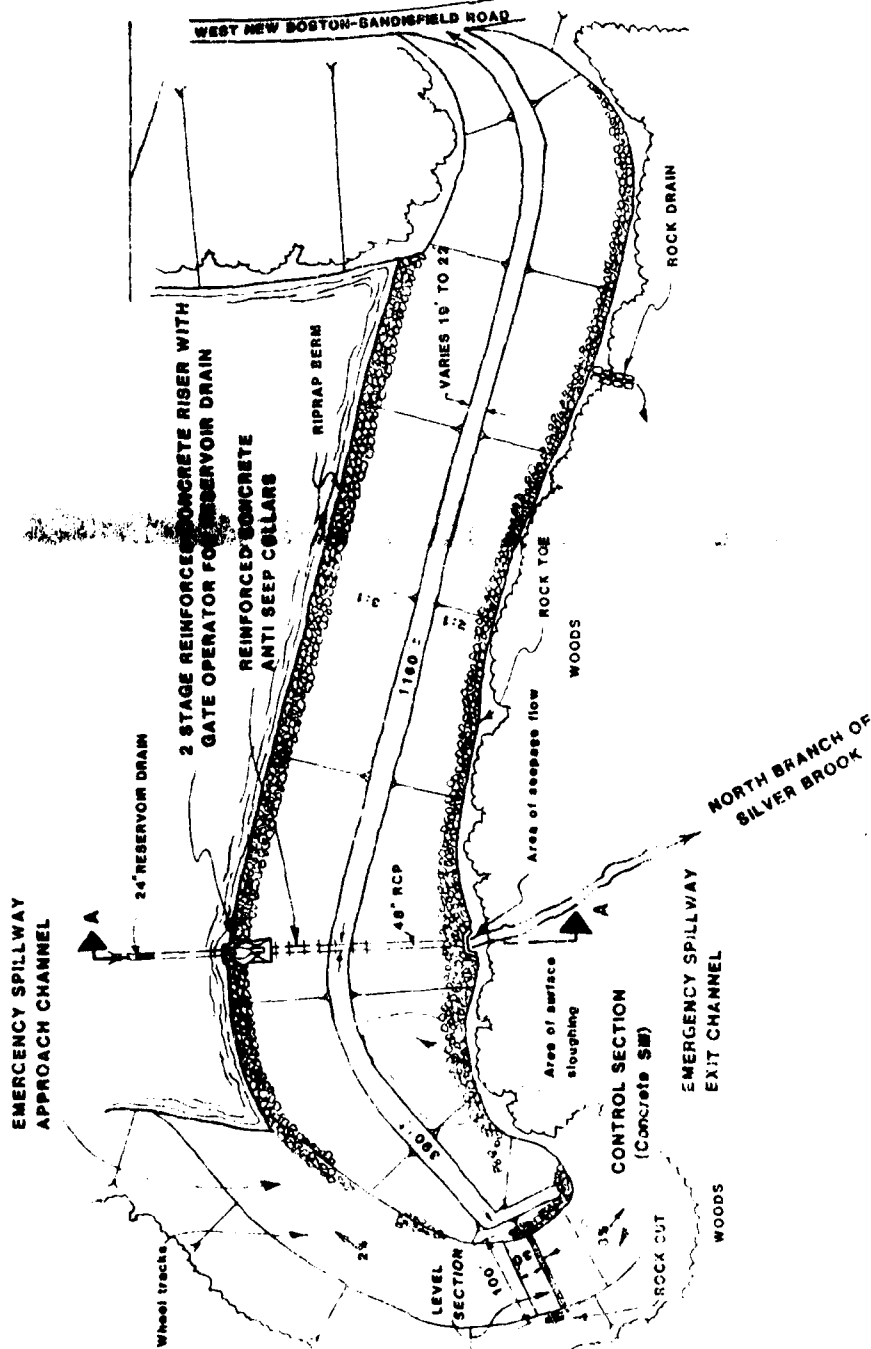
NATIONAL PROGRAM FOR
INSPECTION OF NON-FEDERAL DAMS
NORTH SILVER LAKE DAM
MA 00307

NORTH BRANCH SILVER BROOK

SANDSFIELD MASSACHUSETTS

SCALE: NOT TO SCALE DATE: AUGUST 1980

NORTH SILVER LAKE



GENERAL PLAN

A. SKETCHES COMPILED DURING PHASE I INSPECTION SHOWING
GENERAL LAYOUT OF DAM, TYPICAL SECTIONS AND DETAILS
OF SIGNIFICANT FEATURES:

Figure 1. General Plan of Damsite

Figure 2. Typical Sections

B. COPIES OF SELECTED SHEETS OF AS-BUILT PLANS:

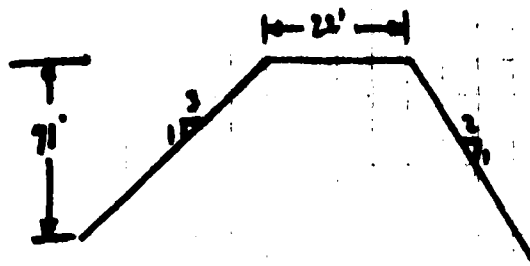
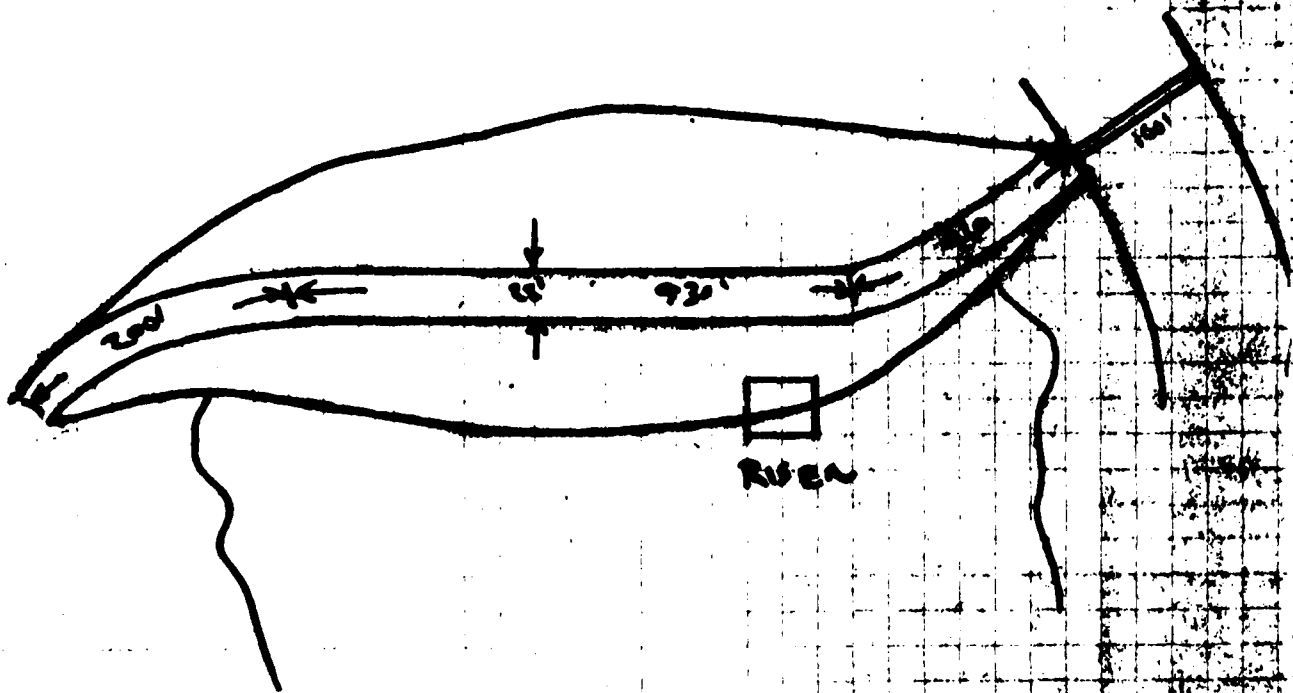
Sheet 1. Cover Sheet

Sheet 4. Plan of Damsite

Sheet 5. Profiles & Sections

Sheet 6. Profile of Cutoff Trench

NORTH SILVER SITE
1-2-260-13



10.

Risk to life and property in event of complete failure.

No. of people _____ Failure could cause some damage to the
Village of New Boston, located approximately
No. of homes _____ 1 mile downstream.
No. of Businesses _____
No. of Industries _____ Type _____
No. of Utilities _____ Type _____
Railroads _____
Other dams _____
Other _____

11.

Attach sketch of dam to this form showing section and plan on 8-1/2" x 11" sheet.

DESCRIPTION OF DAM

DISTRICT ONESubmitted by RD JordanDam No. 1-2-260-13Date 4-6-73City/Town SandisfieldName of Dam Clam River
North Silver Site1. Location: Topo Sheet No. 6-D

Provide 8-1/2" x 11" in clear copy of topo map with location of Dam clearly indicated.

2. Year built: 1969 Year/s of subsequent repairs _____3. Purpose of Dam: Water Supply _____ Recreational _____
Irrigation _____ Other flood control4. Drainage Area: _____ sq. mi. 2374 acres.5. Normal Ponding Area: 17 Acres; Ave. Depth _____
Impoundment: _____ gals; 1040 acre-ft.6. No. and type of dwellings located adjacent to pond or reservoir _____
i.e. summer homes etc. _____7. Dimensions of Dam: Length 1750' Max. Height 71'
Slopes: Upstream Face earth 2:1
Downstream Face earth 2:1
Width across top 22'8. Classification of Dam by Material:
Earth X Conc. Masonry _____ Stone Masonry _____
Timber _____ Rockfill _____ Other _____9. A. Description of present land usage downstream of dam: _____
100% rural; _____ % urban.B. Is there a storage area or flood plain downstream of dam which could accommodate the impoundment in the event of a complete dam failure
Yes X No _____

B2-27

12. Remarks & Recommendations: [Fully Explain]

Only one deficiency was noted during the inspection. One area of the downstream slope approximately 200' from the emergency spillway has sloughed. It in no way endangers the structural integrity of the dam. However, this area should be repaired and reseeded to prevent further damage.

13. Overall Condition:

1. Safe X
2. Minor repairs needed
3. Conditionally safe - major repairs needed
4. Unsafe
5. Reservoir impoundment no longer exists [explain]

Recommend removal from inspection list . B2-26

8.

Downstream Face of Dam: Condition: 1. Good____. 2. Minor Repairs X.
3. Major Repairs____. 4. Urgent Repairs____.

Comments: _____

9.

Emergency Spillway: Condition: 1. Good X. 2. Minor Repairs____.
3. Major Repairs____. 4. Urgent Repairs____.

Comments: _____

10.

Water level @ time of inspection: 17 ft. above____. below X____.
top of dam____.
principal spillway X____.
other____.

11.

Summary of Deficiencies Noted:

Growth [Trees and Brush] on Embankment_____.

Animal Burrows and Washouts_____.

Damage to slopes or top of dam X_____.

Cracked or Damaged Masonry_____.

Evidence of Seepage_____.

Evidence of Piping_____.

Erosion_____.

Leaks_____.

Trash and/or debris impeding flow_____.

Clogged or blocked spillway_____.

Other_____.

INSPECTION REPORT - DAMS AND RESERVOIRS

1. Location: City/Town Sandisfield Dam No. 1-2-260-13Name of Dam Clam River-North Silver Site Inspected by: R. Jordan-BirneyDate of Inspection 4-6-73

2. Owner/s: per: Assessors _____ Prev. Inspection _____

Reg. of Deeds _____ Pers. Contact _____

1. Water Resources Commission 100 Cambridge St. Boston, MA
Name St. & No. City/Town State Tel. No.2. _____
Name St. & No. City/Town State Tel. No.3. _____
Name St. & No. City/Town State Tel. No.

3. Caretaker [if any] e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Name St. & No. City/Town State Tel. No.

4. No. of Pictures taken 4

5. Degree of Hazard: [if dam should fail completely]*

1. Minor x 2. Moderate _____

3. Severe _____ 4. Disastrous _____

*This rating may change as land use changes [future development]

6. Outlet Control: Automatic _____ Manual xOperative x yes: _____ no: _____

Comments: _____

7. Upstream Face of Dam: Condition:

1. Good x 2. Minor Repairs _____

3. Major Repairs _____ 4. Urgent Repairs _____

Comments: _____

2. Remarks & Recommendations: [Fully Explain]

PREVIOUS INSPECTION DATE: APRIL 6, 1973

The sloughed area on the downstream slope reported in 1973 has not been repaired. The area has partially reseeded itself, however, some open spots remain. Except for this small area, the embankments are in good condition, and covered with a good growth of turf and crown vetch. In my opinion, the dam is safe.

For location see Topo 6-D

13. Overall Condition:

1. Safe ☒
2. Minor repairs needed _____
3. Conditionally safe - major repairs needed _____
4. Unsafe _____
5. Reservoir impoundment no longer exists [explain]
Recommend removal from inspection list _____

TYPICAL BORING LOGS

COPIES OF SELECTED TEST HOLES
INCLUDED ON AS-BUILT PLANS

Sheet 24. Logs of Test Holes

Sheet 25. Logs of Test Holes

APPENDIX B-4

APPENDIX C

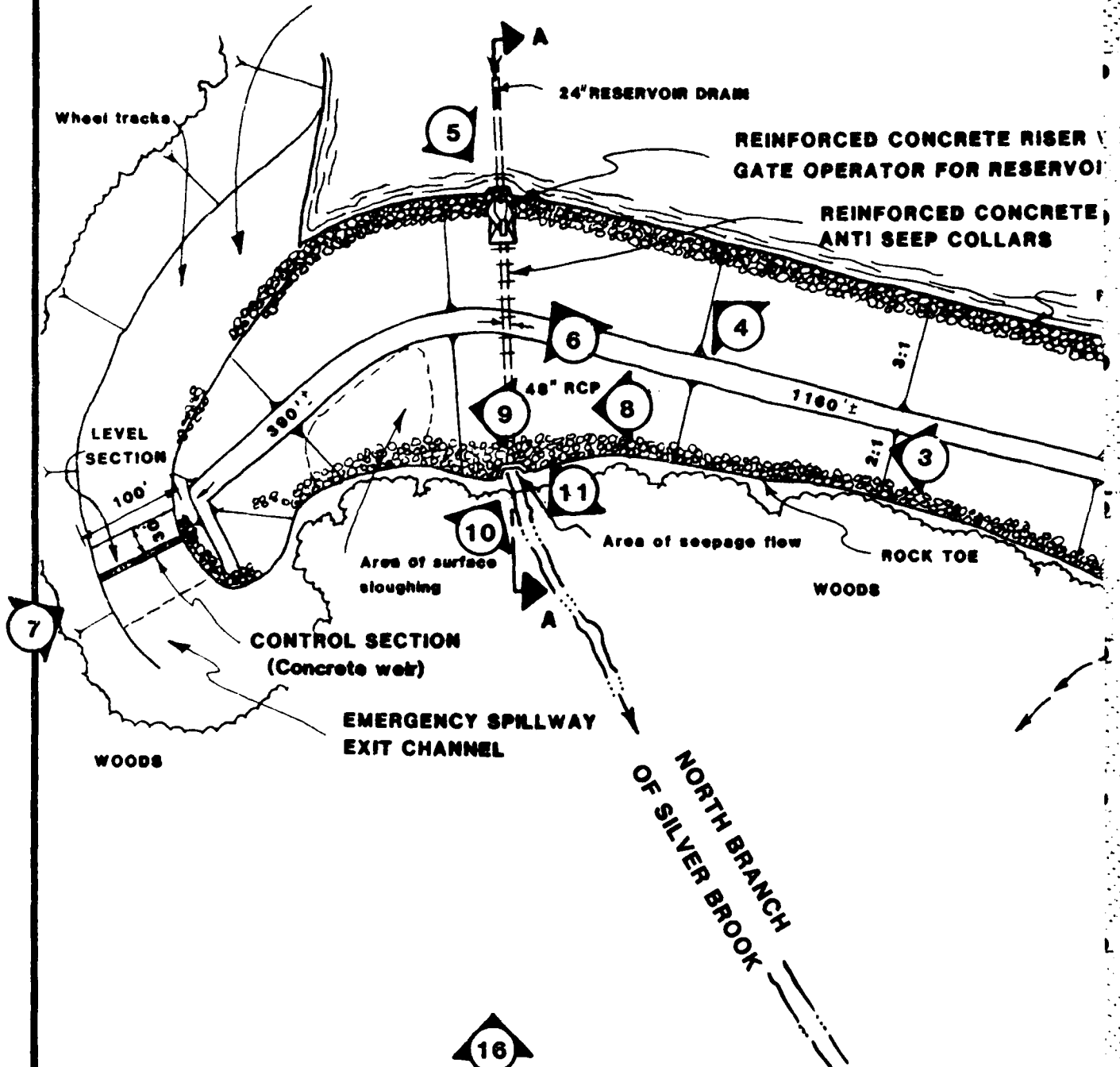
PHOTOGRAPHS

C-1. PHOTOGRAPH INDEX

C-2. SELECTED PHOTOGRAPHS

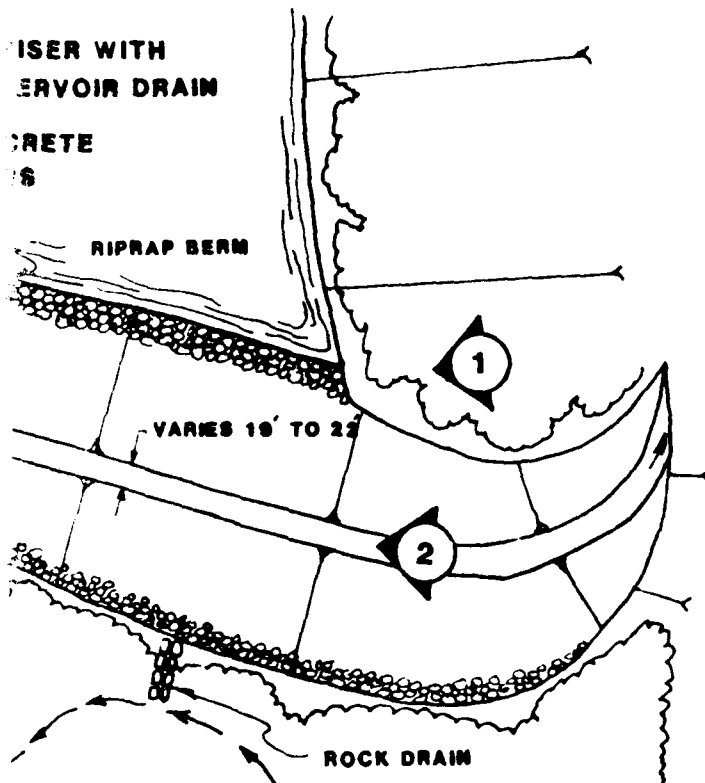
NORTH SILVER LAKE

EMERGENCY SPILLWAY APPROACH CHANNEL



16
(AERIAL)

GENERAL PLAN



NOTE: Schematic Layout Assembled and elevation datum taken from plans prepared by U.S. Dept. of Agriculture Soil Conservation Service entitled "Clam River Watershed Project North Silver Multiple-Purpose Dam."



INDICATES PHOTOGRAPH NUMBER AND DIRECTION IN WHICH PHOTOGRAPH WAS TAKEN

NOTE: NO. 16 IS AN AERIAL VIEW NUMBERS 12,13,14 & 15 ARE NOT INCLUDED IN THE AREA THIS INDEX PLAN COVERS



PHOTO #

LOCATION

12, 13

VEITS ROAD BRIDGE

14, 15

ROUTE 57, WEST NEW BOSTON

APPENDIX C-1

PHOTOGRAPH INDEX

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS

ROBERT G. BROWN & ASSOCIATES, INC
Pittsfield, Massachusetts

NATIONAL PROGRAM FOR
INSPECTION OF NON-FEDERAL DAMS
NORTH SILVER LAKE DAM
MA 00307

NORTH BRANCH SILVER BROOK

SANDISFIELD

MASSACHUSETTS

SCALE: NOT TO SCALE

DATE: AUGUST 1980



Figure 1 - View of upstream face of dam showing 3H:1V vegetated slope with riprap berm at the normal pool elevation. Note concrete riser in embankment.



Figure 2 - View of the crest of dam looking northeasterly.



Figure 3 - View of 2H:1V downstream slope looking south.
Note surface sloughing off the embankment face.



Figure 4 - View of the reinforced concrete riser showing lower stage and upper stage trash racks.

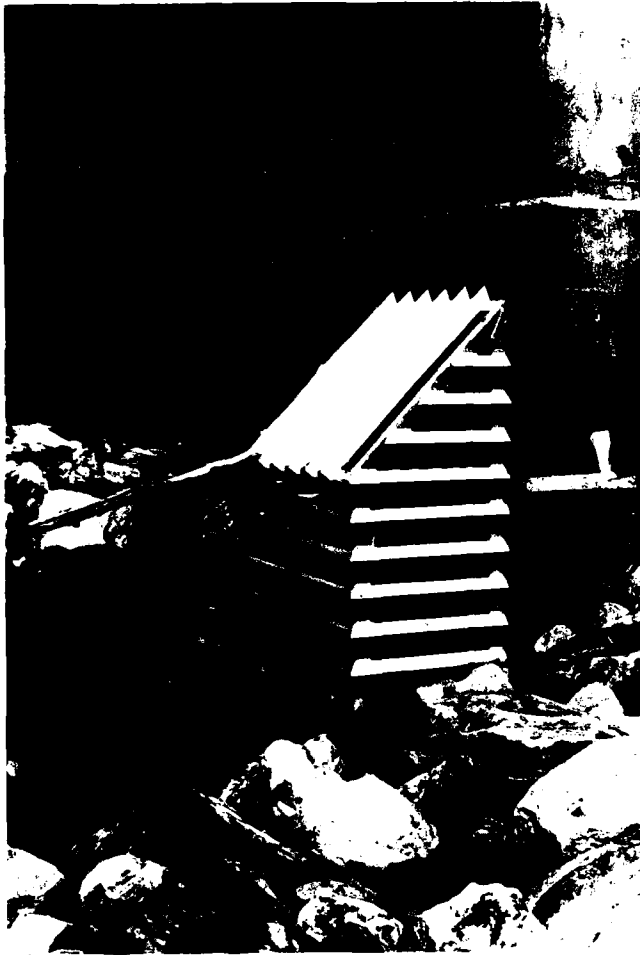


Figure 5

View of trash rack at upstream face of riser. Trash rack protects the 10" by 36" normal pool orifice (not visible).

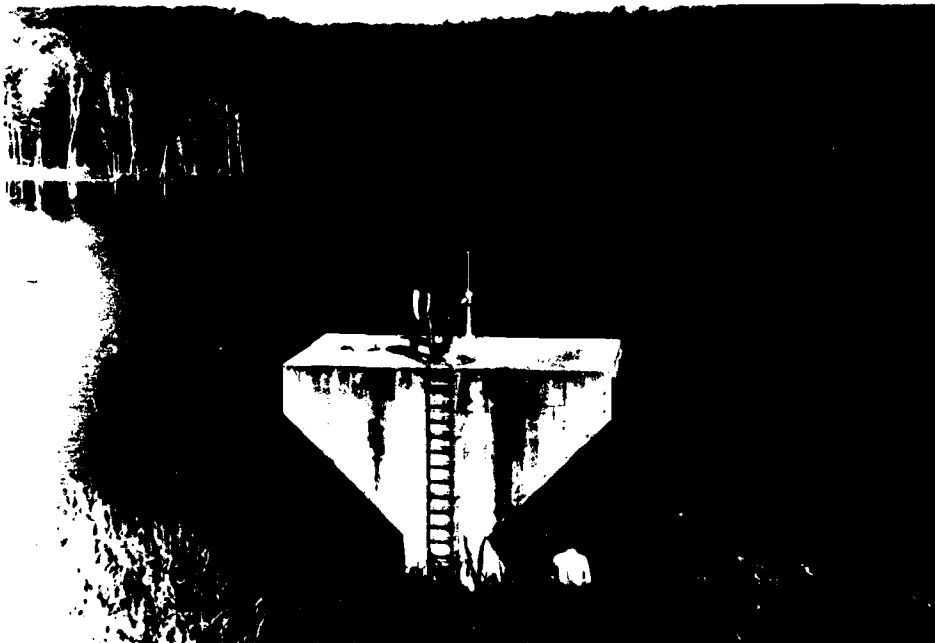


Figure 6 - View of the downstream face of riser showing inspection manhole and gate operator with floor stand for the 24-inch reservoir drain.



Figure 7 - View of the emergency spillway looking north showing concrete weir at control section.



Figure 8 - View of the downstream face of embankment looking south showing surface sloughing. Note material which has slid over rock toe.



Figure 9 - A closer view of area shown in Photograph 8.



Figure 10 - View of concrete headwall for 48-inch outlet conduit.
Note concrete pavement on channel bottom.



Figure 11 - View of channel downstream of headwall for 48-inch outlet conduit.



Figure 12 - View of bridge at Veits Road about 3000 feet downstream of damsite.



Figure 13 - View of bridge opening at Veits Road about 3000 feet downstream of damsite.



Figure 14 - View of bridge opening (looking upstream) at Route 57 in the village of West New Boston about 7700 feet downstream of damsite. Note structures in close proximity to the brook.



Figure 15 - View of structures near bridge at Route 57 in the Village of West New Boston. Building in foreground houses a tavern and two apartments.

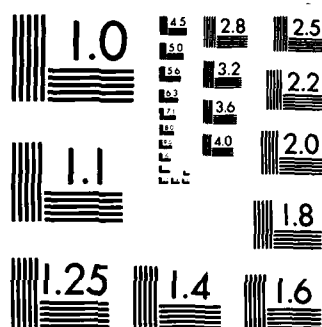
NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
NORTH SILVER LAKE DAM. (U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV AUG 80

2/2

F/G 13/13

NL

END



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

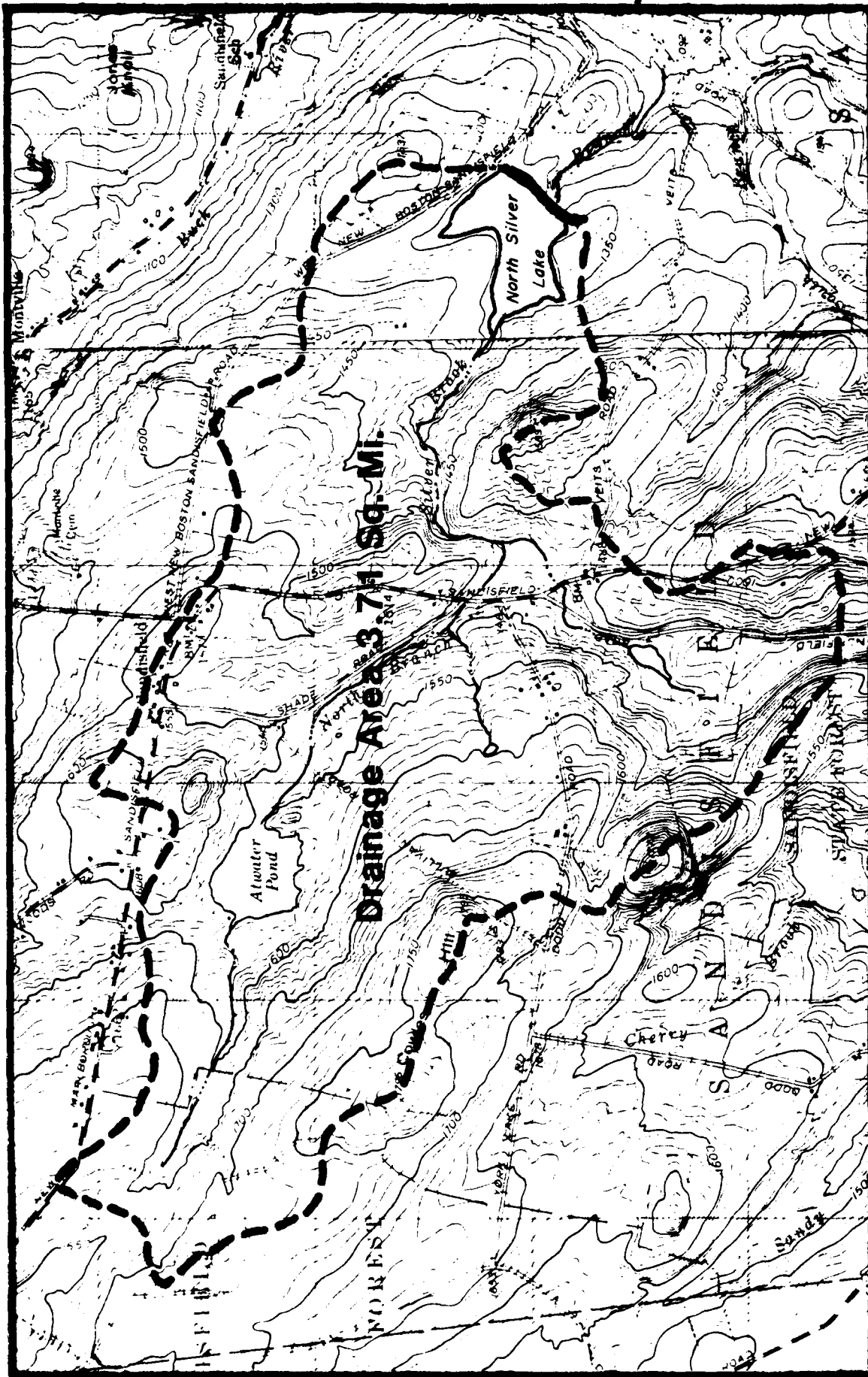


Figure 16 - Aerial view of damsite showing normal reservoir area.

APPENDIX D

HYDRAULIC AND HYDROLOGIC COMPUTATIONS

- D-1. DRAINAGE AREA MAP
- D-2. COMPUTATIONS (INCLUDING COPIES OF SELECTED
SCS DESIGN COMPUTATIONS)



NORTH SILVER LAKE DAM

SANDISFIELD, MASS. Identification No. MA 00307

Tolland Center Quadrangle

1:25000

APPENDIX D-1

Robert G. Brown & Associates, Inc.
Berkshire Common - Third Floor North
PITTSFIELD, MASSACHUSETTS 01201
(413) 499-1560

JOB MA 301 - NORTH SILVER
SHEET NO. 1 OF 16
CALCULATED BY JW DATE 6/2/80
CHECKED BY JW DATE 7/27/80
SCALE _____

DRAINAGE AREA

3.71 SQ. MILES ✓

Step 1: Calculate PMF — FROM "PRELIMINARY GUIDANCE
FOR ESTIMATING MAXIMUM PROBABLE DISCHARGES"
USING CURVE, FOR MOUNTAINOUS TERRAIN, $C_{SM} = 2325 C_{SM}^{PMF}$

$$PMF = 2325 \times 3.71 = 8626 \text{ CFS} \checkmark$$

$$1/2 \text{ PMF} = 4313 \text{ CFS} \checkmark$$

@ 8626 CFS, ELEVATION = 1341.0 FT. ✓

SIZE - Intermediate
Hazard - High
Test Flood - PMF

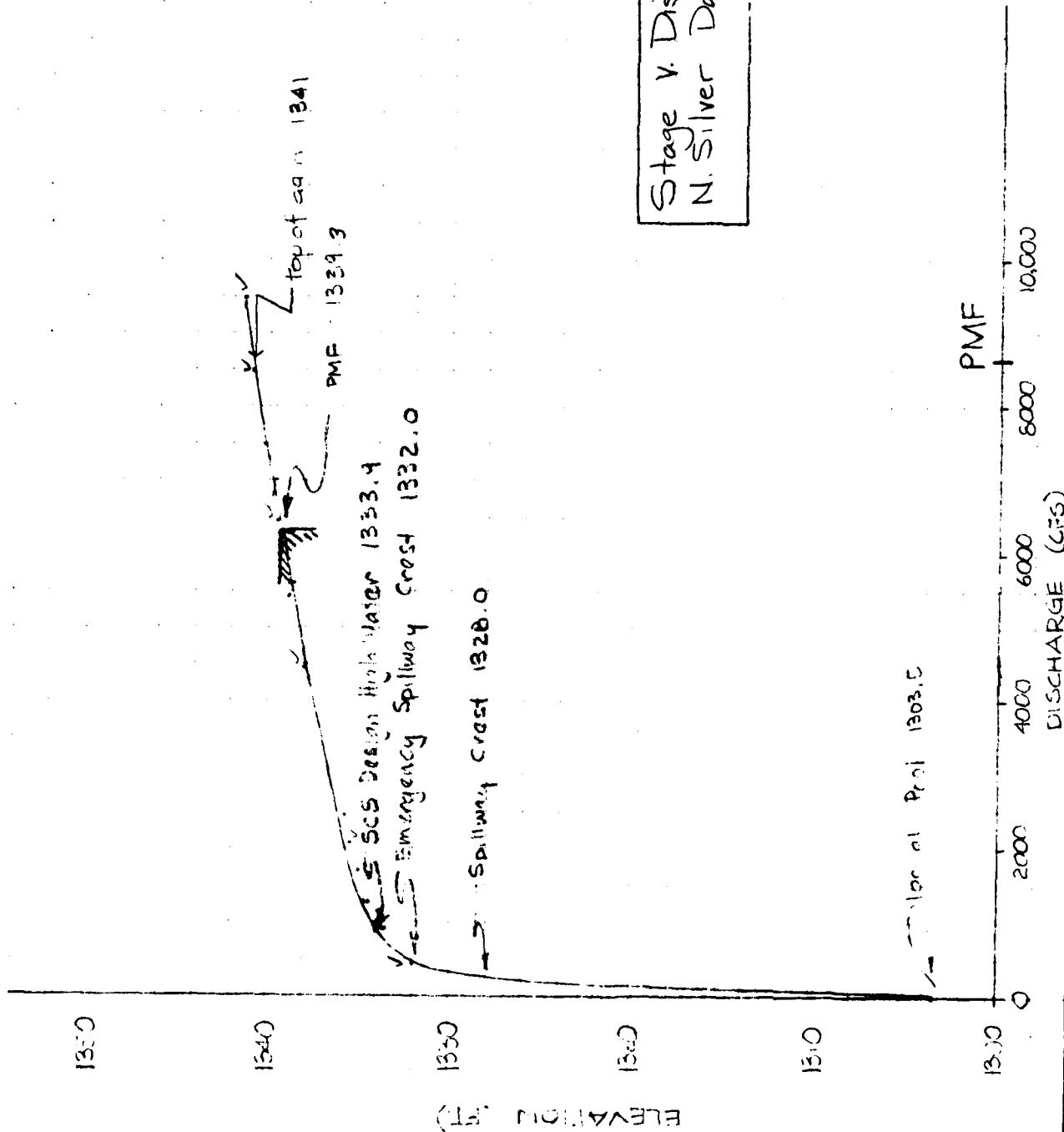
APPENDIX D-2

Robert G. Brown & Associates, Inc.
 Berkshire Common - Third Floor North
 PITTSFIELD, MASSACHUSETTS 01201
 (413) 499-1560

JOB: MA 307
 SHEET NO: 2 OF 16
 CALCULATED BY: JV DATE: 6/2/80
 CHECKED BY: JMC DATE: 7/2/80
 SCALE: _____

Note: Unit of SCS Design Data

Stage V. Discharge
 N. Silver Dam



S. LODGE
Subject AREA

6/23/66

GHM

0-23-66

MA-355

CAPACITY CURVES

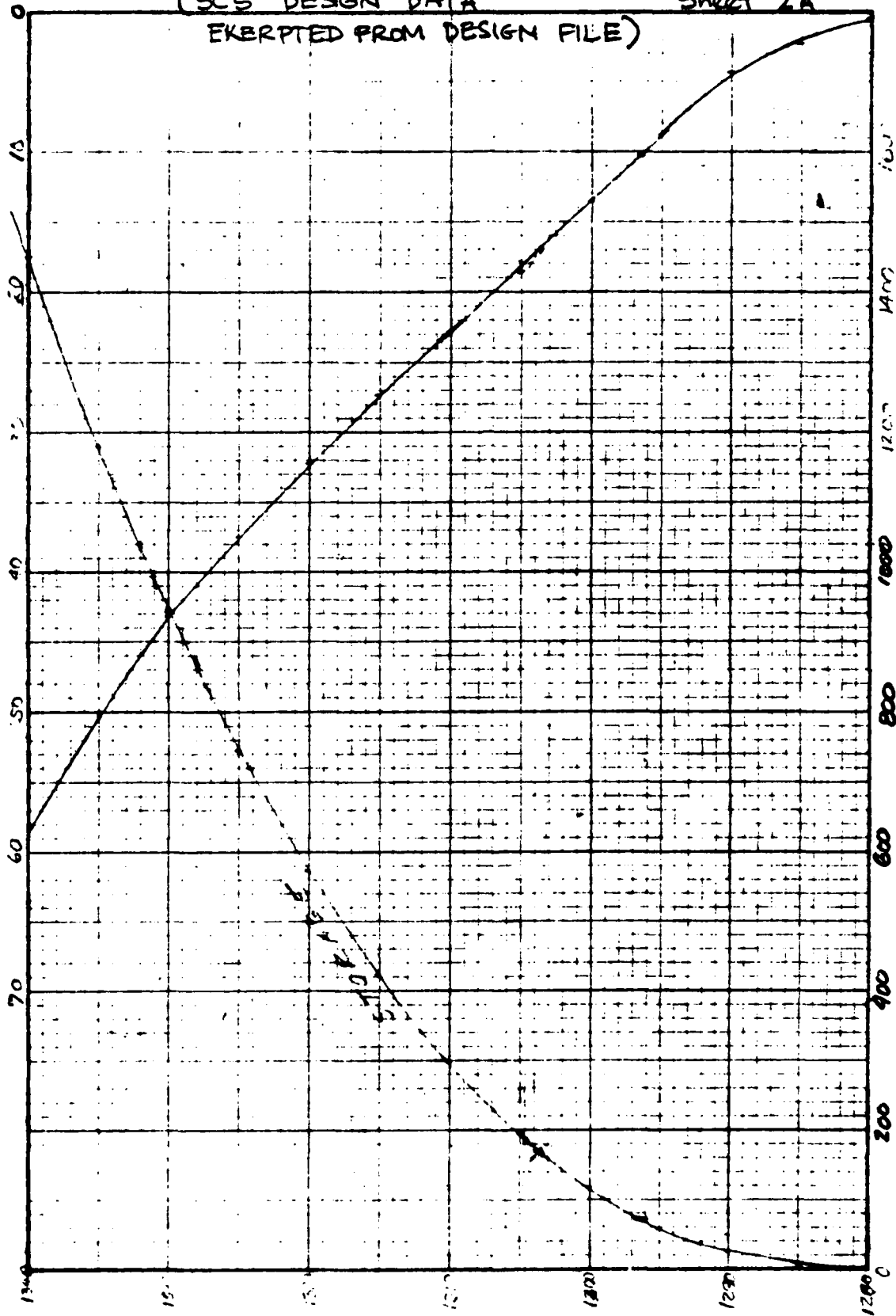
Sheet 2 of 20

(SCS DESIGN DATA

Sheet 2A

EXERPTED FROM DESIGN FILE)

AREA - ACRES



ELEVATION

MASSACHUSETTS

CLAY LANE RD - NORTH SILVER

C. DODGE

1-20-67

1-20-67

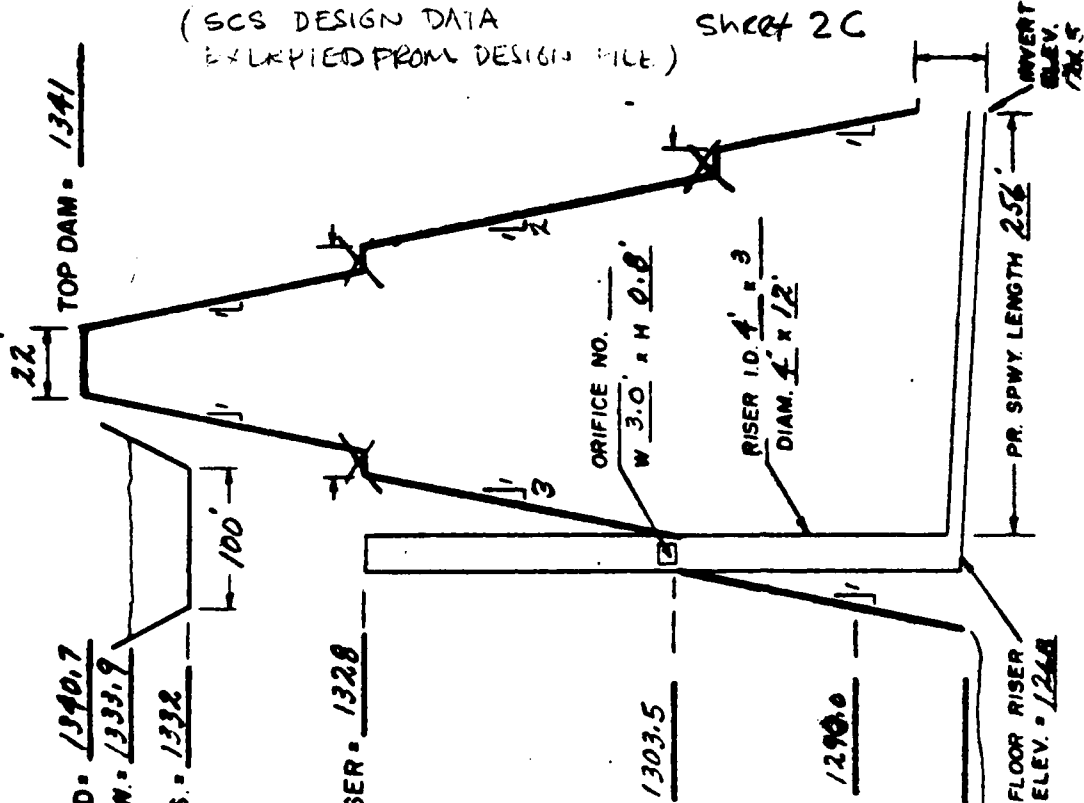
1-20-67

14A-055

SHEET OF

(SCS DESIGN DATA
EXTRACTED FROM DESIGN FILE)

SHEET 2C

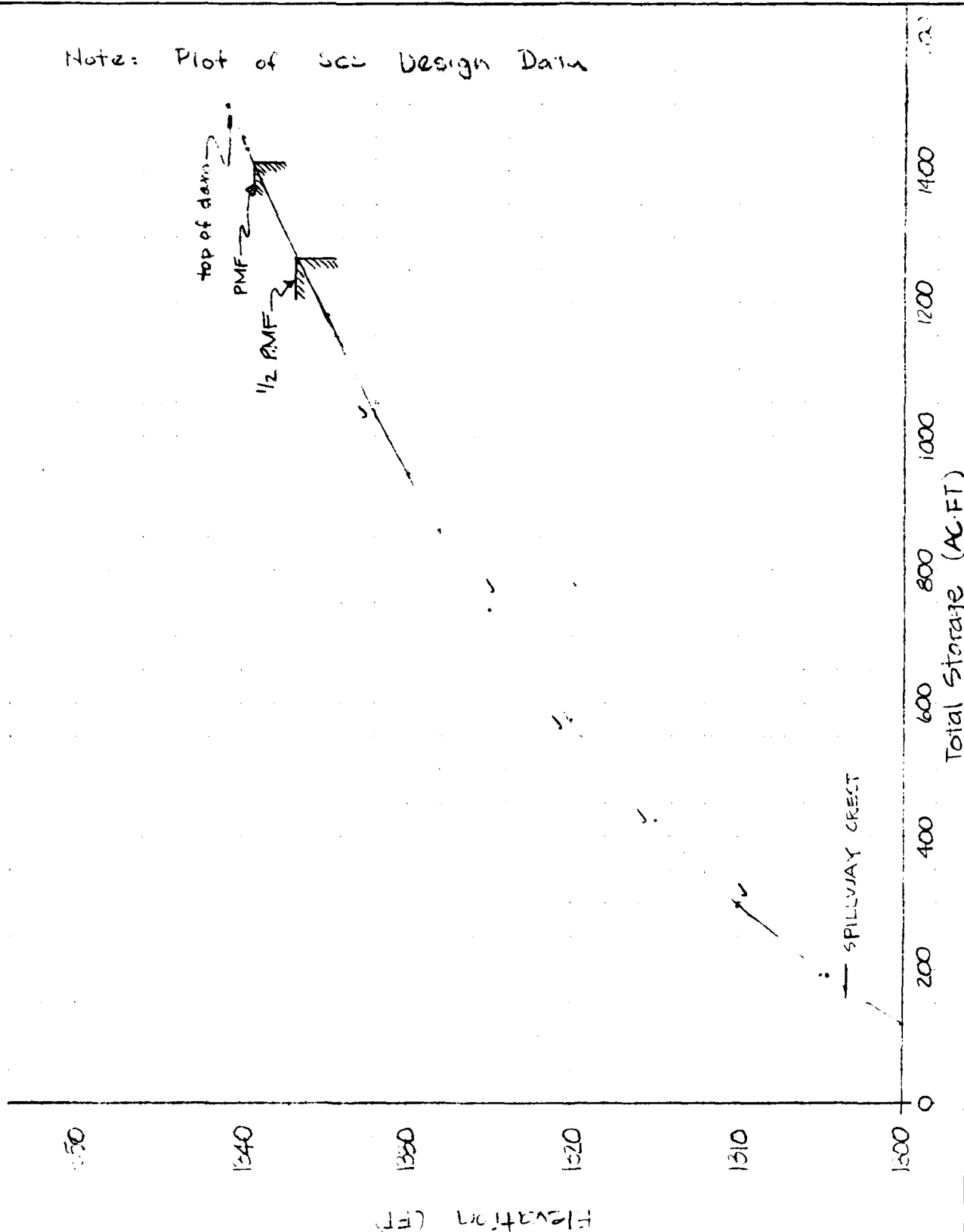


PAGE REF.	ALLOTTED STORAGE acre - feet	TOTAL STORAGE acre - feet	AREA acres	DESIGN ELEVATIONS feet
		1500 ±		FREEBOARD = 1340.7 D.H.W. = 1333.9 CREST E.S. = 1332
	E.S. STORAGE 80	1120	49	
	FLOOD STORAGE 178	1040	46	
		862	41	CREST RISER = 1328
	FLOOD STORAGE 694	188	17	ORIFICE = 1303.5
	MULTIPLE PURPOSE 144	24	4.5	SEDIMENT POOL = 1290.0
	SEDIMENT STORAGE 24			ORIGIN = FLOOR RISER ELEV. = 1248

Robert G. Brown & Associates, Inc.
 Berkshire Common - Third Floor North
 PITTSFIELD, MASSACHUSETTS 01201
 (413) 499-1560

JOB MA 3071
 SHEET NO. 3 OF 16
 CALCULATED BY JWC DATE 6/2/80
 CHECKED BY Jmc DATE 7/25/80
 SCALE _____

Note: Plot of SCU Design Data



FOR TEST FLOOD (PMF) = 8626 CFS ✓

VOLUME OF SURCHARGE IN INCHES OF RUNOFF —

$$Q_{P1} = 8626 \text{ CFS} \rightarrow \text{ELEV.} = 1341.0 \text{ FT.} \checkmark$$

$$\text{STORAGE @ ELEV. } 1341.0 \text{ FT.} \rightarrow 1500 \text{ AC. FT.} \checkmark$$

$$\text{STORAGE @ ELEV. } 1303.5 \text{ FT.} \checkmark \text{ (ORIFICE CREST)} \rightarrow 170 \text{ AC. FT.} \checkmark$$

$$\Delta \text{ STORAGE} = 1330 \text{ AC. FT.} \checkmark$$

$$1330 \text{ AC. FT.} \times \frac{1}{3.71 \text{ sq. mi.}} \times \frac{1 \text{ sq. mi.}}{640 \text{ AC.}} \times \frac{12''}{\text{FT.}} = 6.72'' \text{ RUNOFF } \checkmark \text{ (STOR 1)}$$

COMPUTE Q_{P2} —

$$Q_{P2} = Q_{P1} \times \left(1 - \frac{\text{STOR 1}}{19''}\right)$$

$$Q_{P2} = 8626 \times \left(1 - \frac{6.72''}{19''}\right) = 5607 \text{ CFS} \checkmark$$

DETERMINE SURCHARGE HT. TO PASS Q_{P2} —

$$Q_{P2} = 5607 \text{ CFS} \rightarrow 1338.5 \text{ FT.} \checkmark \rightarrow 1375 \text{ AC. FT.} \checkmark$$

$$1375 \text{ AC. FT.} - 170 \text{ AC. FT.} = 1205 \text{ AC. FT.} \checkmark$$

$$1205 \times \frac{1}{3.71 \text{ sq. mi.}} \times \frac{1 \text{ sq. mi.}}{640 \text{ AC.}} \times \frac{12''}{\text{FT.}} = 6.09'' \text{ RUNOFF } \checkmark \text{ (STOR 2)}$$

Robert G. Brown & Associates, Inc.
Berkshire Common - Third Floor North
PITTSFIELD, MASSACHUSETTS 01201
(413) 499-1560

JOB MA 307
SHEET NO 5 OF 16
CALCULATED BY JW DATE 6/2/80
CHECKED BY Jmc DATE 7/25/80
SCALE -

AVERAGE $\frac{6.12' + 6.09'}{2} = 6.41''$

$$6.41'' \times 3.71 \text{ SQ MI} \times \frac{640 \text{ AC}}{\text{SQ MI}} \times \frac{\text{FT}}{12''} = 1267.34 \text{ AC, FT.} \checkmark$$
$$+ \frac{170}{1437.3} \text{ AC, FT.}$$

ELEVATION = 1339.8 FT.

TEST FLOOD (PMP) = 8626 CFS (INFLOW)

TEST FLOOD ELEVATION = 1339.8 FT

TOP OF DAM = 1341.7 FT

TEST FLOOD DISCHARGE = 7000 CFS

2ND ITERATION

$$Qp2 = 8626 \left(1 - \frac{6.41}{1.9}\right) = 5716 \text{ CFS}$$

$$Qp2 = 5716 \text{ CFS} \rightarrow \text{ELEV. 1339} \rightarrow 1390 \text{ AF} - 170 = 1220 \text{ AF}$$

$$1220 \text{ AF} \times \frac{1}{3.71 \text{ SQ MI}} \times \frac{1}{640 \text{ AC}} \times \frac{\text{FT}}{12''} = 6.17'' \text{ RUNOFF}$$

$$\text{AVG STORAGE} = \frac{(6.41 + 6.17)}{2} = 6.29''$$

$$6.29'' \times 3.71 \text{ SQ MI} \times \frac{640 \text{ AC}}{\text{SQ MI}} \times \frac{\text{FT}}{12''} = 1244 \text{ AF}$$

$$1244 \text{ AF} + 170 \text{ AF} = 1414 \text{ AF}$$

$$\text{TEST FLOOD ELEV.} = \underline{1339.8 \text{ FT}}$$

$$\text{ROUTED TEST FLOOD OUTFLOW} = 6300 \text{ CFS}$$

Robert G. Brown & Associates, Inc.
Berkshire Common - Third Floor North
PITTSFIELD, MASSACHUSETTS 01201
(413) 499-1560

JOB MA 307
SHEET NO 6 OF 16
CALCULATED BY JW DATE 6/3/80
CHECKED BY JW DATE 7/2/80
SCALE _____

FOR $\frac{1}{2}$ PMF = 4313 CFS

VOLUME OF SURCHARGE IN INCHES OF RUNOFF

$$Q_{P1} = 4313 \text{ CFS} \rightarrow \text{ELEV.} = 1338 \text{ FT.}$$

$$\text{STORAGE @ ELEV. } 1338 \rightarrow 1340 \text{ AC. FT.}$$

$$\text{STORAGE @ ELEV. } 1303.5 \text{ (ORIFICE CREST)} \rightarrow 170 \text{ AC. FT.}$$

$$\Delta \text{ STORAGE} = 1170 \text{ AC. FT.}$$

$$170 \text{ AC. FT.} \times \frac{1}{3.71 \text{ SQ MI.}} \times \frac{1 \text{ SQ MI.}}{640 \text{ AC.}} \times \frac{12''}{\text{FT.}} = 5.91'' \text{ RUNOFF (STOR 1)}$$

COMPUTE Q_{P2}

$$Q_{P2} = Q_{P1} \times \left(1 - \frac{\text{STOR 1}}{0.5}\right)$$

$$= 4313 \times \left(1 - \frac{5.91}{0.5}\right) = 1630 \text{ CFS}$$

DETERMINE SURCHARGE HT. TO PASS Q_{P2}

$$Q_{P2} = 1630 \text{ CFS} \rightarrow 1335.5 \text{ FT.} \rightarrow 1200 \text{ AC. FT.}$$

$$1200 \text{ AC. FT.} - 170 \text{ AC. FT.} = 1030 \text{ AC. FT.}$$

$$1030 \text{ AC. FT.} \times \frac{1}{3.71 \text{ SQ MI.}} \times \frac{1 \text{ SQ MI.}}{640 \text{ AC.}} \times \frac{12''}{\text{FT.}} = 5.21'' \text{ RUNOFF}$$

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AVERAGE STORAGE

$$\frac{5.91" + 5.21"}{2} = 5.56"$$

$$5.56" \times 3.71 \text{ SQ MI} \times \frac{640 \text{ AC}}{\text{SQ MI}} \times \frac{1 \text{ FT}}{12"} = 1100 \text{ AC FT}$$

$$\frac{+170}{1270} \text{ AC FT.}$$

ELEVATION \approx 1336.5 FT.

FOR $\frac{1}{2}$ PMF = 4313 CFS (INFLOW) ✓

$\frac{1}{2}$ PMF ELEVATION = 1336.5 FT.

TOP OF DAM = 1341 FT ✓

$\frac{1}{2}$ PMF DISCHARGE = 3000 CFS

2ND ITERATION

$$Q_{p2} = 4313 \left(1 - \frac{5.56}{12}\right) = 1789 \text{ CFS} \rightarrow \text{ELEV } 1735.1 \rightarrow 1190$$

$$1190 \text{ AF} - 170 \text{ AF} = 1020 \text{ AF}$$

$$1020 \text{ AF} \times \frac{12"/\text{FT}}{(3.71 \text{ MI}^2)(640 \text{ AC/MI}^2)} = 5.17"$$

$$\text{STOR AVG} = (5.56 + 5.17)/2 = 5.37"$$

$$3.71 \times 3.71 \text{ MI}^2 \times 640 \text{ AC/MI}^2 \times 1/12 \text{ "/FT.} = 1063 \text{ AF} + 110 = 1173 \text{ AF}$$

$\frac{1}{2}$ PMF ROUTED OUTFLOW = 2500 CFS.

$\frac{1}{2}$ PMF ELEV. = 1336.0 MSL.

BREACH ANALYSIS

ASSUME - FAILURE W/ WATER AT PMF ELEV. (1331.5)

- BREACH WIDTH (W_b) = 40% OF CREST LENGTH
AT MIDHEIGHT

$$W_b = 0.4(1300') = 520'$$

$$Y_o = 1339.3 - 1270 = 69.3'$$

$$Q_p = 8/27 W_b \sqrt{g} Y_o^{3/2}$$

$$Q_p = 8/27 (520') (32.2)^{1/2} (69.3')^{3/2}$$

$$Q_p \approx 504,000 \text{ CFS}$$

EM. SPILLWAY Q AT ELEV 1339.3 = 5700 CFS
(Note - Principal Spillway assumed washed out)

TOTAL BREACH Q \approx 510,000 CFS

- THIS WOULD CORRESPOND TO A FLOOD WAVE
HEIGHT OF APPROXIMATELY:

48' \pm 2000' D.S.

19' \pm @ VEITS LD

24 = @ BACK W.

20 \pm @ ET 5'

- VELOCITIES ARE ESTIMATED TO BE IN THE
ORDER OF 40-50 FPS

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VALLEY RATING CURVE

SECTION ONE - NORTH BRANCH SILVER BROOK - 2000' ± D.S.

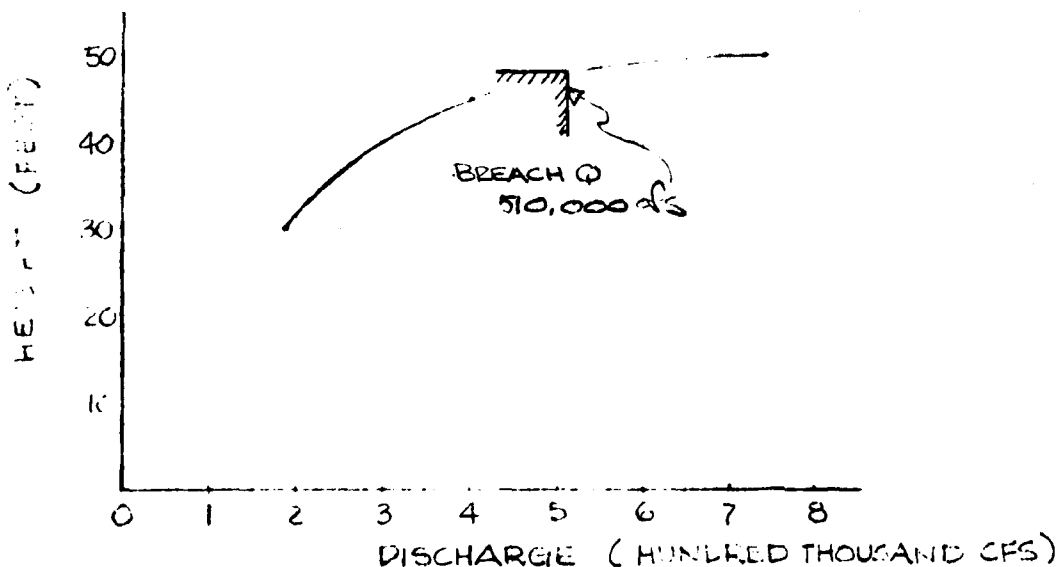
USING MANNING'S EQU. $Q = \frac{1.49}{n} A R^{2/3} S_o^{1/2}$ ✓

$n = 0.07$ ✓

$S_o = 0.01$ ✓

ASSUME TRAPEZOIDAL CHANNEL

H FEET	A SQ. FT.	W _P FEET	R _H FEET	Q CFS	CROSS-SECTION
30	5,100	307	16.62	188,820	
40	6,800	312	21.79	202,000	
45	8,100	315	25.70	402,000	
50	14,750	560	26.34	743,420	



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OF 16

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CHECKED BY ...

DATE 7/27/80

SCALE


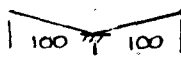


VALLEY RATING CURVE

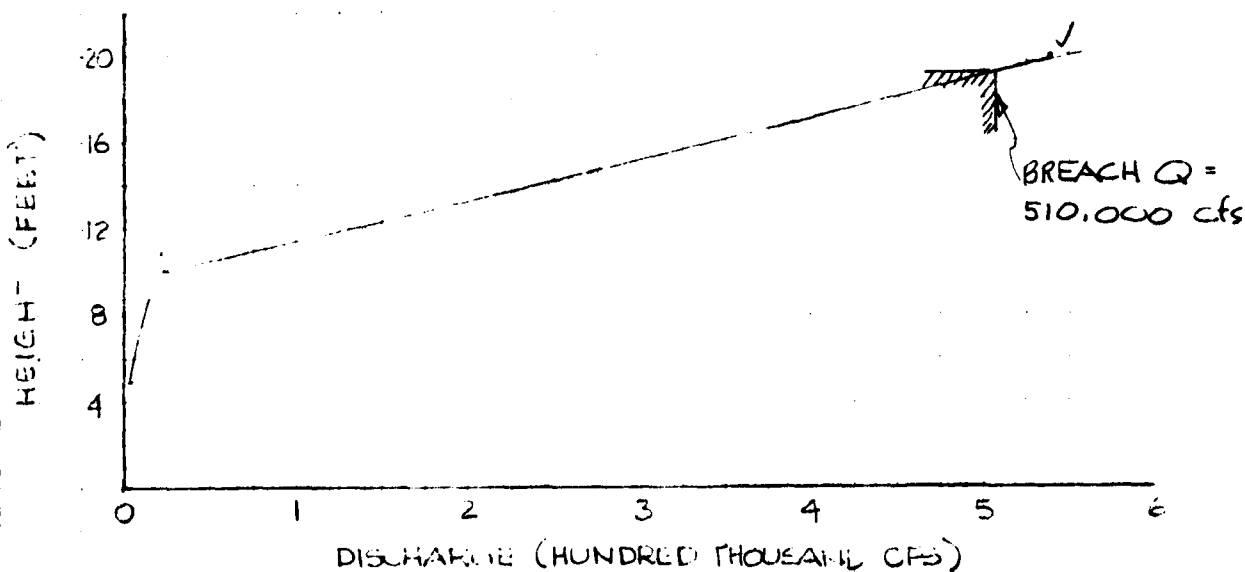
SECTION TWO - NORTH BRANCH SILVER BROOK @ VEITS ROAD

$n = 0.03$ ✓

$S_o = 0.03$

ASSUME TRIANGULAR CHANNEL

H FEET	A SQ. FT.	W_p FEET	R_H FEET	Q CFS	CROSS-SECTION
5	250	100 ✓	2.5 ✓	4000 ✓	
10	1000 ✓	200 ✓	5 ✓	24,680 ✓	
15	9000 ✓	1200 ✓	7.5 ✓	298,850 ✓	
20	13,400 ✓	1340 ✓	10 ✓	539,175 ✓	



ESTIMATED V_1 - UPSTREAM OF BACK RD

FLOOD STORAGE IN VALLEY

$$400' \text{ WIDE} \times 1800' \text{ LONG} \times 20' \text{ DEEP} / 43,560 = 330 \text{ A.F.} \checkmark$$

$$S = 1414 \text{ A.F.}$$

$$Q_{P2 \text{ TRIAL}} = Q_1 \left(1 - \frac{V_1}{S}\right)$$

$$Q_{P2 \text{ TRIAL}} = 510,000 \left(1 - \frac{330}{1414}\right) \approx 391,000 \text{ CFS}$$

$$V_2 \approx 400' \times 1800' \times 18' / 43560 = 297 \text{ A.F.} \checkmark$$

$$V_{\text{AVG}} = \frac{330 + 297}{2} = 314 \text{ A.F.} \checkmark$$

$$Q_{P2} = 510,000 \left(1 - \frac{314}{1414}\right) \approx \underline{397,000 \text{ CFS}}$$

EST. REACH OUTFLOW
BEYOND BACK ROAD
W/ VALLEY STORAGE TAKEN
INTO ACCOUNT

VALLEY RATING CURVE

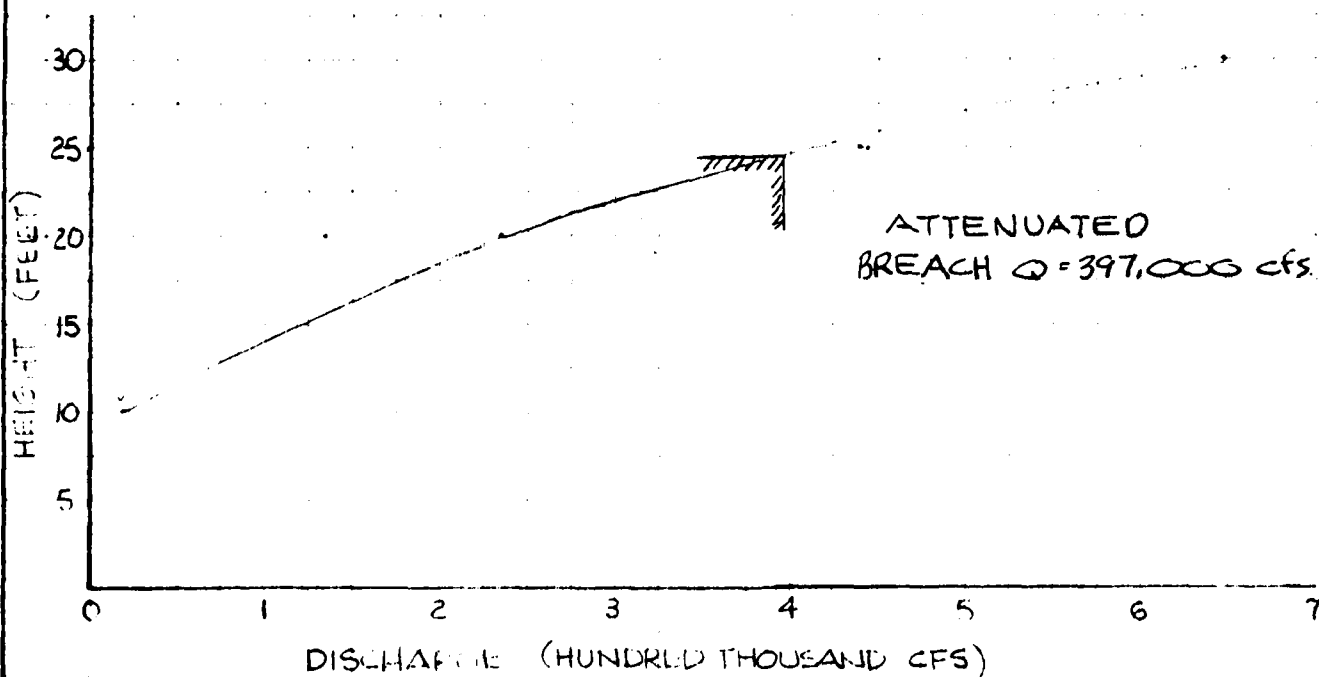
SECTION THREE - SILVER BROOK @ BACK RD

$n = 0.03$

$S_o = 0.02$

ASSUME TRIANGULAR CHANNEL

H FEET	A SQ. FT.	Wp FEET	Rh FEET	Q CFS	CROSS-SECTION
10	1000	200	5	20,650	
20	4100	410	10	134,175	
25	11,625	930	12.5	443,375	
30	15,000	1000	15	646,900	



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VALLEY RATING CURVE

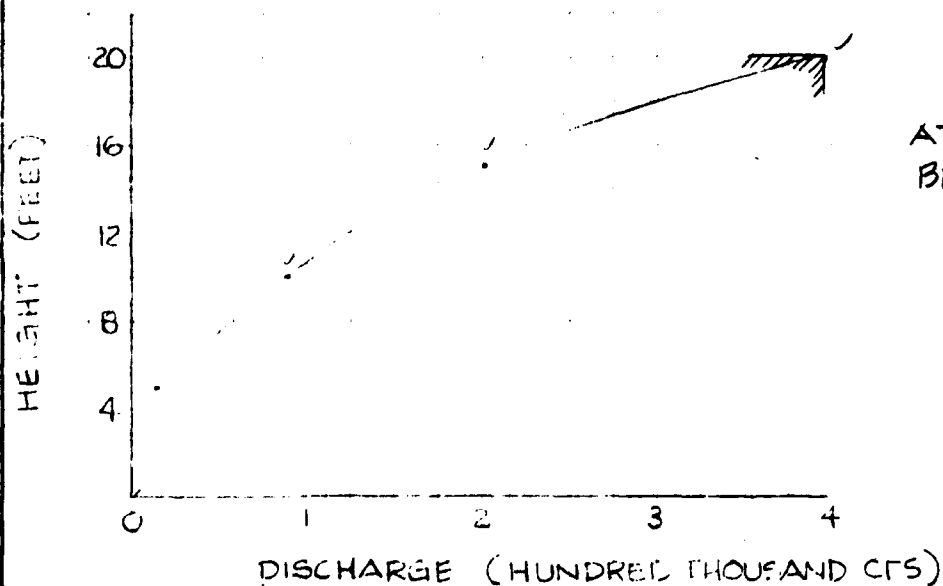
SECTION FOUR - SILVER BROOK AT RT 57

$n = 0.03$

$S_o = 0.03$

ASSUME TRIANGULAR SECTION

H FEET	A SQ. FT.	Wp FEET	Rh FEET	Q CFS	CROSS-SECTION
5	875 ✓	350 ✓	2.5 ✓	13,925 ✓	
10	3500 ✓	700 ✓	5 ✓	88,520 ✓	
15	6375 ✓	850 ✓	7.5 ✓	207,630 ✓	
20	10,000 ✓	1000 ✓	10 ✓	394,925 ✓	



ATTENUATED
BREACH $Q = 397,000$ cfs

ESTIMATED BRIDGE CAPACITIES

1. VEITS ROAD

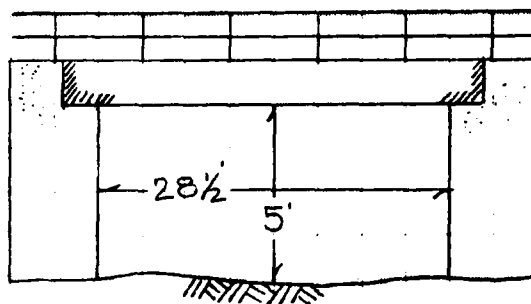
$$n = 0.03$$

$$S = 0.03$$

$$Vp = 67 \checkmark$$

$$R = 2.13 \checkmark$$

$$A = 143$$

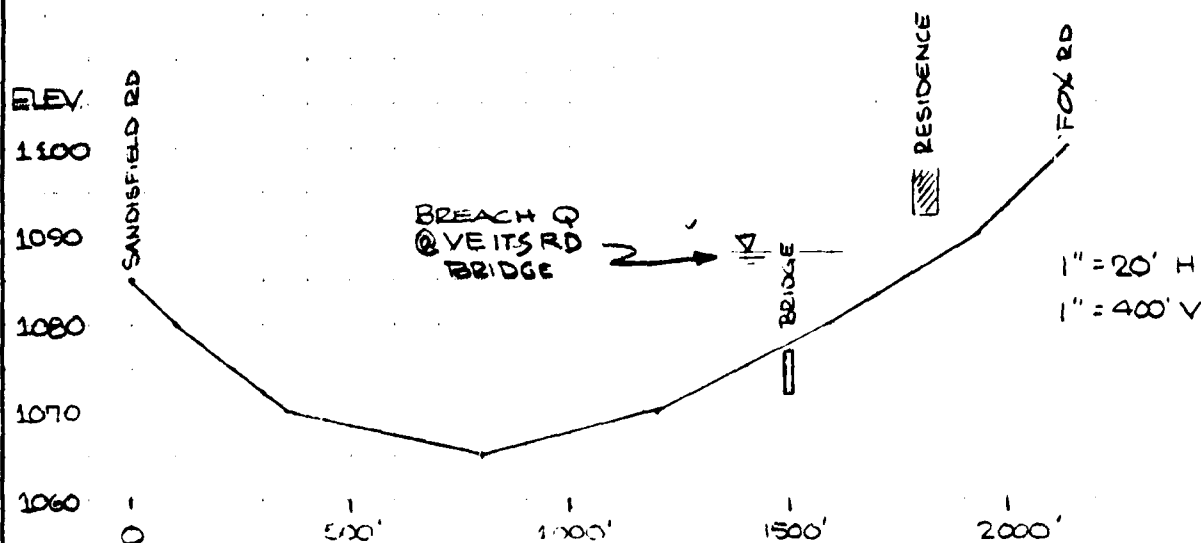


NTS.

$$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$$

$$Q_{FULL} = \frac{1.49}{0.03} (143) (2.13)^{0.67} (0.03)^{1/2} \checkmark$$

$$Q_{FULL} = 2036 \text{ CFS} \checkmark$$



PROFILE OF VEITS ROAD

— WHEN BRIDGE CAPACITY IS EXCEEDED, WILL FLOW NORTHERLY DOWN VEITS ROAD TO ITS LOW POINT, THEN N.EASTERLY TO THE MAIN BRANCH OF SILVER BROOK.

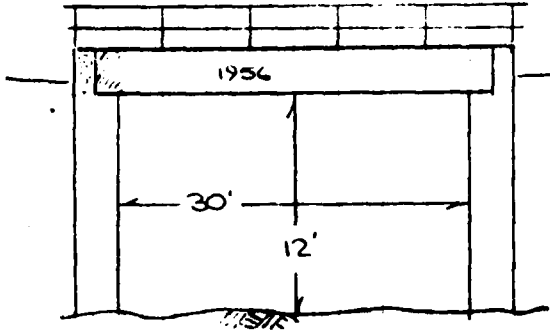
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JOB NORTH SILVER

SHEET NO 14 OF 16
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2. BRIDGE AT BACK ROAD

~ 1 MILE D.S.



$$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$$

FULL FLOW

$$A = 360 \text{ SF} \checkmark$$

$$W_p = 84 \checkmark$$

$$R = 4.29 \checkmark$$

$$n = 0.03 \checkmark$$

$$S = 10'/200' = 0.05 \checkmark$$

$$Q_{full} = \frac{1.49}{0.03} (360) (4.29)^{2/3} (0.05)^{1/2}$$

$$Q_{full} \approx \underline{10,600 \text{ cfs}} \checkmark$$

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3. BRIDGE AT RT. 57

~ 1.7 MILES D.S.

$$A = 133 \text{ SF} \checkmark$$

$$W_p = 52 \checkmark$$

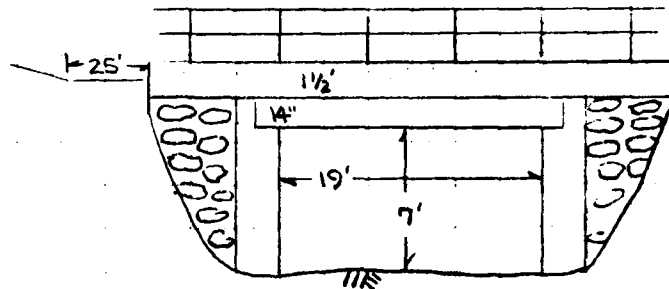
$$R = 2.56 \checkmark$$

$$n = 0.03$$

$$S = 0.03$$

$$Q_{full} = 1.49 / 0.03 \checkmark (133) (2.56)^{67} (0.03)^{1/2}$$

$$Q_{full} \approx 2100 \text{ cfs} \checkmark$$



2' LOWER @ 100'

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DISCHARGE CAPACITY OF PRINCIPAL SPILLWAY

$$A = 12.57 \text{ S.F. } \checkmark \quad (48" \text{ dia.})$$

$$H = 7.4' \checkmark$$

$$C = 0.6 \checkmark$$

$$Q = CA \sqrt{2gH}$$

$$Q = 0.6(12.57)(2.31 \cdot 7.4)^{1/2}$$

$$Q = 510 \text{ cfs } \checkmark$$

DISCHARGE CAPACITY OF 24" RESERVOIR DRAIN

WITH WATER @ NORMAL POOL

$$Q = CH^{1/2} \checkmark$$

$$C = A \sqrt{\frac{2g}{1 + K_v + K_p L_p}}$$

$$C = 14.2 \checkmark$$

$$Q = (14.2)(32.5)^{1/2}$$

$$Q = 81 \text{ cfs } \checkmark$$

$$A = 24" \phi = 3.14 \checkmark$$

$$n = 0.012$$

$$K_p = 0.01058$$

$$K_v = 1$$

$$L_p = 108 \checkmark$$

$$H = 1303.5 - 1271 = 32.5' \checkmark$$

APPENDIX E

**INFORMATION AS CONTAINED IN
THE NATIONAL INVENTORY OF DAMS**

NOT AVAILABLE AT THIS TIME

END

FILMED

7-85

DTIC